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ABSTRACT

The conference reported in this publication was funded by STAR (System of Technology to Achieve Results), a program of the Minnesota Governor's Advisory Council on Technology, under Public Law 100-407 (the Technology Related Assistance for Individuals with Disabilities Act of 1988.) The conference focused on the development and availability of technology to assist postsecondary institutions to provide services needed by students with disabilities. Following opening remarks by Rachel Wobschall, the texts of 13 papers are presented. The papers are: "The High Tech Centers for the Disabled" (Carl Brown); "Students with Disabilities: Rights and Responsibilities in Education" (Jay Brill); "'Low' Technology Assists to Higher Education" (Mary Kay Albanese); "Computer Technology at Normandale" (Tammi Anderson); "Resource Technology" (Scott Dehn); "Computer Word Processing and the Speech Synthesizer" (Richard Frederick); "The Achievement of a Dream" (Bennit Pittsley); and "State Service Panel Presentation" (Rachel Wobschall), which includes "Adaptive Technology As It Relates to Postsecondary Education" (Michael Dugan), "Telecommunications Access for Communication Impaired Persons" (William Lamson), "Transition Services" (Roger Strand), and "Vocational Rehabilitation Services Tailored to the Needs of the Individual" (Paul Bridges). The final paper in this compilation is "Planning Adaptive Computing Services in Post-Secondary Education: An Integrated Approach" (Darola Hockley). A conference agenda is provided. (JDD)

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BEYOND RAMPS

Accessing Higher Education through Technology

A Disability Services Conference for Higher Education

April 18-19, 1990

Minnesota Community Colleges
203 Capitol Square Bldg.
550 Cedar Street
St. Paul, MN 55101

STAR
Star Program
300 Centennial Building
658 Cedar Street
St. Paul, MN 55155

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BEYOND RAMPS:

Accessing Higher Education Through Technology

A Disability Services conference funded by STAR (A System of Technology To Achieve Results). A program of the Governor's Advisory Council on Technology for people with disabilities under P.L. 100-407.

The program objectives are focused on the development, and availability of technology to assist post-secondary institutions in providing the services needed by students with disabilities who are attending post-secondary institutions.

Special recognition must be given in several instances; Rachel Wobschall for her insight in obtaining the funding for the System of Technology to Achieve Results (STAR) programs, and for coordinating the featured speakers for this conference. Banning Hanscom, Vice Chancellor for Student Services, and Kitty Hennemann, Student Services Officer, Minnesota Community College System, for contributing to the STAR proposal by agreeing to host and plan the post-secondary conference. The Minnesota Community College Disability Services Advisory Committee played a major role in planning, publicizing and organizing this conference. Jan Johannes, a consultant that has been especially helpful in the time consuming task of performing the work that needs to be conducted in organizing this conference, along with the Minnesota Community College student services secretarial staff, Dawn Peacock and Stacie Young. Melanie Vasterling, Minnesota Community College System, Assistant Communications Director for the final phase in formulating the cover to the conference proceedings. We wish to thank the conference presenters and the vendors for their time and energy that was devoted to this program.

This conference, as well as the conference proceedings, represent a profession-wide effort and reflect a field that is committed to providing quality education to students with disabilities.

PROGRAM

Wednesday, April 18, 1990

7:00 pm	Social, Hors d'oeuvres EXHIBITS	Plaza Room

Thursday, April 19, 1990

7:30 am	Registration EXHIBITS	Foyer Corridor
8:00 am	Continental Breakfast EXHIBITS	Great Hall Foyer Corridor
9:00 am	Welcome - Dr. Neil Christenson Overview - Rachel Wobschall Keynote - Carl Brown	Great Hall East A & B Great Hall East A & B Great Hall East A & B
10:00 am	Presentation - Jay Brill Students' Rights and Responsibilities, 504-508	Great Hall East A & B
10:45 am	Break - EXHIBITS	Great Hall East A & B/Corridor
11:15 am	Choice of Groups Panel of Users Model Campus Computing Program Simple Technology Demonstration of High Tech Center Student Activities	 Veranda 1 Veranda 3 Veranda 5 Great Hall East A & B
12:00 pm	LUNCH EXHIBITS	Boulevard Room Corridor
1:15 pm	Topic: Low-tech Systems Mary Kay Albanese	Great Hall East A & B
2:00 pm	State Services	Great Hall East A & B
2:45 pm	Break - EXHIBITS	Great Hall East A & B/Corridor
3:15 pm	Choice of Groups Panel of Users Model Campus Computing Program Simple Technology Demonstration of High Tech Center Student Activities	 Veranda 1 Veranda 3 Veranda 5 Great Hall East A & B
4:00 pm	Closing Statements Kitty Hennemann	Great Hall East A & B

COMMITTEE MEMBERS

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BEYOND RAMPS

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OPENING REMARKS
Beyond Ramps: Accessing Higher Education
Through Technology
April 19, 1990
Rachel A. Wobschall
Executive Director
Governor's Advisory Council on Technology
for People with Disabilities

I am pleased to welcome you to Beyond Ramps: Accessing Higher Education Through Technology. This conference is a result of Minnesota's successful application for funds under P.L. 100-407, the Technology Related Assistance for Individuals with Disabilities Act of 1988. Minnesota is one of the initial nine states to receive funding under this Act. Minnesota's program is called "STAR" - A System of Technology to Achieve Results.

We are serious. We expect results. From access to tools - to employment opportunities to changes in attitudes, about people with disabilities. Today's conference will provide access to these tools:

- Model programs for the integration of technology on today's campuses.
- Legislative update on student rights and responsibilities.
- State services available to you.
- Classroom modifications and adaptations.
- A users panel.
- Exhibits and displays of state of the art assistive technology.

These tools, including everything from a page turner to a microcomputer, are devices that may allow individuals with disabilities to accomplish things better and faster. It provides the opportunity to do things previously thought impossible. It can add to an individual's self esteem and self confidence to face the challenges that success in higher education requires.

For students, I encourage you to approach today's conference with the following questions:

1. What do I like?
2. What do I dislike?
3. What will I use?
4. What do I need to do to obtain this tool, skill, ability?

I would challenge you that the tools are available - your only limitations are those bounded by your own expectations and imagination. Consider the following:

Did you know...

Approximately:

- 36 million Americans have a disability;
- 4.3 million youth are in special education;
- 150,000 youths in special education are using adaptive technology on a daily basis;
- 200,000 people with disabilities are entering post secondary training each year;
- 10% of all college students have a disability.

The number of people with disabilities in the general population is increasing due to:

- Medical advances that are saving accident victims, expanding the lifespan of people with disabilities, and saving premature babies;
- Expanding lifespans from health conscious lifestyles, better work environments, and medical advances;
- An increasing awareness and accommodations;
- Technological advances allowing people with disabilities to more fully develop, demonstrate, and apply their abilities.

For disability coordinators, faculty, and computer service personnel I encourage you to approach today with the question - how can I approach students - both the ones I serve or teach today - as well as the ones who will come to the campus in the future - everyone from students with developmental disabilities to those with mild learning disabilities so that they will have the tools to discover <u>all</u> the educational opportunities the campus has to offer.

I would like to thank the community college system for organizing today's conference, the planning committee and the presenters - many of whom are professional colleagues as well as close personal friends all of whom are committed to the full participation of students with disabilities in the higher education system.

* Statistics courtesy of Educom Project EASI March 1990.

THE HIGH TECH CENTERS FOR THE DISABLED

Presented by

Carl Brown
High Tech Center or the Disabled
California Community Colleges Chancellor's Office
1109 Ninth Street
Sacramento, CA 95814

The High Tech Centers For The Disabled

California has a long history of providing specialized educational programs for the disabled. As early as 1860, a State supported school for deaf and blind children had been established in San Francisco. Motivated in part by Section 504 of the newly enacted Federal Rehabilitation Act of 1973, which read:

> "no otherwise qualified handicapped person, shall on the basis of handicap, be excluded from participation in, be denied the benefits of, or otherwise be subjected to discrimination under any program or activity that receives or benefits from federal financial assistance,"

The California legislature embarked on a series of landmark reforms designed to enhance educational opportunities for the disabled in each of the three public segments of higher education (University of California, California State University, and the California Community Colleges.)

In 1976, passage of Assembly Bill 77 (Lanterman, 1976) by the California legislature marked a turning point in the lives of thousands of disabled Californians. This bill authorized development of state funded support services and instruction for students with disabilities in the California Community Colleges. Prior to the bill's passage, the community college system, with a state-wide enrollment on its 106 campuses of nearly one million students, was attended by fewer than five thousand disabled students. Within the past twelve years, the number of disabled students attending California community colleges has grown to more than fifty thousand (California Community Colleges Budget Change Proposal, 1988.)

Although disabled students are attending California community colleges in ever increasing numbers, their level of academic preparation for higher education is often inadequate (Horn, Shell & Severs, 1986). Whether this is a consequence of limited educational opportunity in the K-12 sector or an artifact of disability on the education process is an issue which has yet to be determined. Under the mandate of AB77, the California Community Colleges Chancellor's Office has, through its Disabled Students Programs and Services (DSP&S) unit, instituted a number of state-wide programs intended to assist disabled students in the successful completion of their post-secondary education. Among the newest of these programs is the state-wide network of High Tech Centers for the Disabled.

For disabled and non-disabled students alike, access to computers is becoming an increasingly critical factor in the successful completion of higher education. Assistive computer technologies provide students with disabilities alternative methods for viewing the computer screen, using the computer keyboard, and benefiting from computerized productivity tools. The net result is enhanced opportunity for access and success in post-secondary education.

A Brief History of the High Tech Center Program

In the Spring of 1984, the Disabled Students Services program at Monterey Peninsula College began offering courses in word processing to students with disabilities. Within the first week of classes, the difficulty of using microcomputers, even for students with relatively mild orthopedic disabilities, was obvious. How, for example, could a student having only one finger with which to type hold down two keys at once?

Through trial and error, effective solutions to these access difficulties were developed. Course enrollment increased dramatically. Disabled individuals who had never considered post-secondary education were enrolling at Monterey Peninsula College in order to learn word processing using assistive computer technology. And they were staying on to become participants in mainstream courses.

After careful consideration, it was determined that a real need existed for a systematic program of identification, testing and implementation of assistive computer technology at Monterey Peninsula College. The High Tech Center would be a training facility rather than a protected environment. Disabled students would come to the High Tech Center to learn the use of assistive computer technologies appropriate to their disability. When a functional level of competency had been attained, students would transition to mainstream courses where, if computers were used, assistive computer technology would be available.

The success of the program at Monterey Peninsula College led many other California community colleges to begin High Tech Centers of their own. Responding to the obvious academic and vocational benefits of these early programs, in June, 1986, the California Community Colleges Chancellor's Office established the state-wide High Tech Center Training Unit in Sacramento, California. The program was charged with providing support and training for faculty in California's 107 community colleges in the area of assistive computer technology, and with exploration, evaluation, and implementation of new and emerging technologies of potential benefit to students with disabilities.

Between October, 1986 and June, 1988, the California State Department of Rehabilitation in cooperation with the California Colleges Chancellor's Office, awarded the Community Colleges Foundation a series of grants totaling $5.5 million dollars in order to establish High Tech Centers in California community colleges based on the model developed at Monterey Peninsula College. Presently, there are fifty-one High Tech Centers funded through this cooperative undertaking located at community colleges across the state. Three California State University, one University of California, two Regional Occupational Program, and one high school High Tech Center sites were also funded. An additional 14 community colleges have independently begun High Tech Center programs (See Appendix A.) At the present time, community college High Tech Centers range in enrollment from thirty students to over two hundred on some campuses. Average program size is approximately forty students. Programs are typically managed by two half-time or one full-time specialist possessing a Master's degree in either Learning Disabilities, Speech and Language, Visual, or Physical Disabilities.

The intent of each program is to provide low vision, blind, deaf and hard-of-hearing, learning disabled, physically disabled, and brain injured students with training in, and access to, assistive and instructional systems which allow them to compete effectively in both the academic and work-place environments. This year, more than five thousand students with disabilities will participate in the program making it the largest project ever undertaken to provide disabled students in post-secondary education with full access to microcomputers.

Outcomes and Accomplishments

During the three years the California Community Colleges Chancellor's Office High Tech Center for the Disabled has been in operation, it has undertaken and completed a variety of outcomes studies, support services, publications, and cooperative agreements intended to enhance the success of students with disabilities enrolled in California community colleges. The High Tech Center has completed two major outcomes studies:

1. The Characteristics of Students with Disabilities Enrolled in the California Community Colleges High Tech Centers for the Disabled;

In order to learn more about the population of students with disabilities attending High Tech Center programs, a study was conducted using data collected from students who enrolled in and completed a first semester High Tech Center course (Computer Access 1) between June of 1987 and June of 1988 (n=555.) The 25 colleges included in this study represented rural, suburban, and urban settings.

This descriptive study set out to identify the characteristics of a sample of 555 students with disabilities enrolled in the California Community Colleges High Tech Centers programs. The study examined the students from three different but interrelated viewpoints: general characteristics of the entire sample, characteristics of the sample by disability type, and characteristics of the sample by gender.

o General Characteristics

From analysis of the general characteristics of students with disabilities enrolled in the High Tech Programs, a fairly distinct picture emerges:

The High Tech Centers programs are used fairly equally by both males and females with male usage slightly ahead of female. The program is predominantly used by Caucasians, followed by Hispanics and then Blacks. A large percent (34%) of students who use the High Tech Center are generally younger (between nineteen and twenty-four years of age) than most community college going students whose average age is thirty-four. Students with learning, orthopedic, or multiple disabilities are the majority participants in the program followed by persons with visual disabilities. (See figures 1, 2, and 3.)

The majority of students in the High Tech Centers program are very likely entering college for the first time and plan on transferring to a four-year college. Although most students enrolled in the High Tech Center program to increase their chances of success in other classes, some enrolled to improve job skills, for other or personal reasons. (See figure 4.)

Whereas students were probably exposed to computers for the first time between the ninth and twelfth grades, the High Tech Center will very, likely provide a first experience with assistive computer technologies (See figure 5.) Before enrolling in the High Tech Center program, students generally found computer use "moderately difficult to difficult". After completing the course, students find computer use "moderately easy to easy" and are confident in their ability to use assistive technologies. (See figure 6.)

Figure 1: Age of Participants.

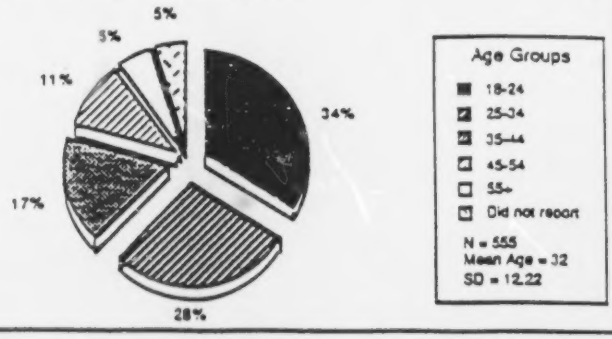


Figure 2: Ethnicity of Participants

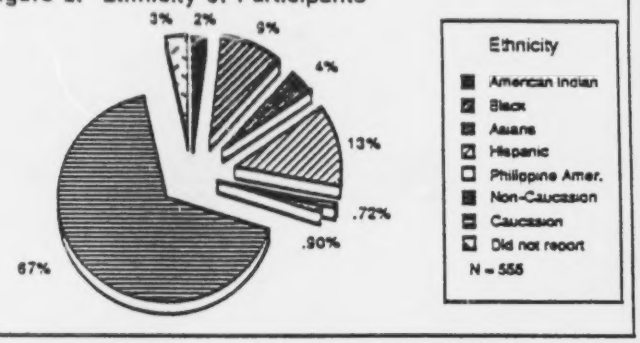


Figure 3: Participants Disability Type

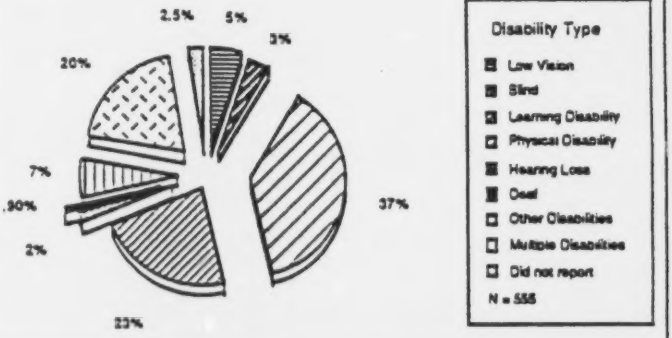
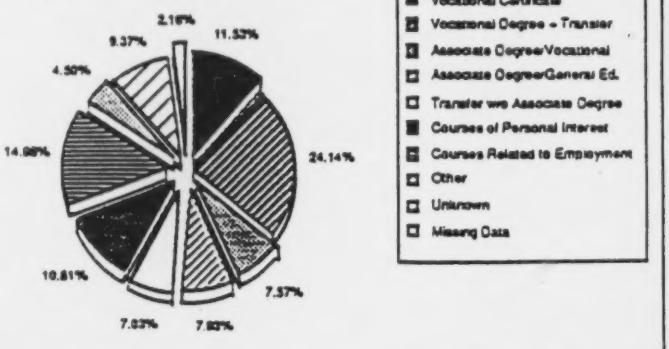
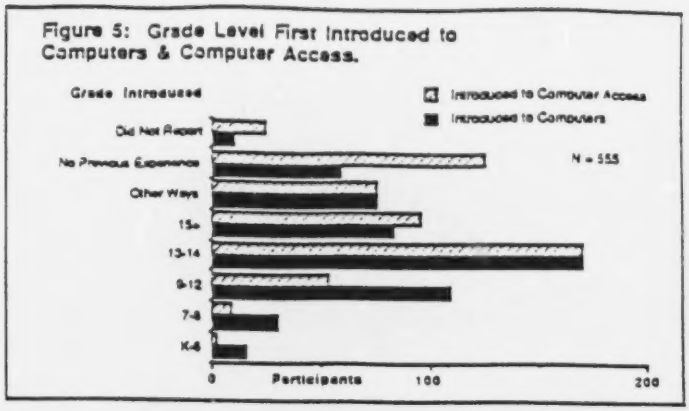


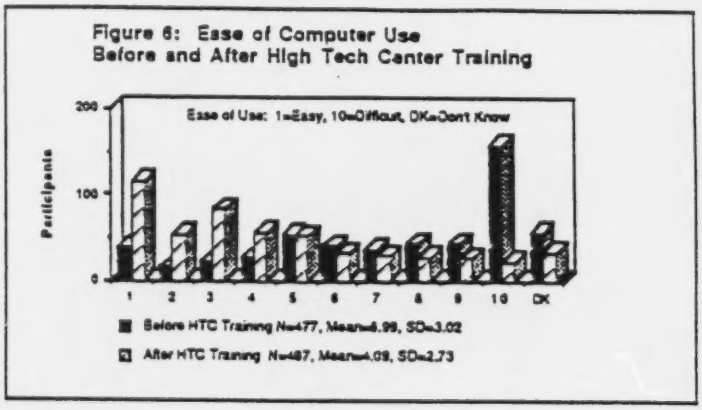
Figure 4: Educational Goals



With regard to the quality of instruction received, students report a high level of confidence in the ability of their instructor to answer questions relating to computer access, select correct computer access systems, and assist with special learning needs.



While quite confident in their ability to use the technology, the data analysis reveals some confusion on the student's part with regard to the importance of computer access to graduation from college. Although students generally agree that it is important, they do not agree as decisively as with other questions in this study. This may be due, in large part, to the more youthful population of this sample and the lack of academic experience of first time college students rather than to any artifact of disability.



With regard to the effect of disability on opportunities for employment, again, results of the data analysis display some uncertainty on the student's part. Although students are clearly aware that their disability will be a factor, they appear to be uncertain as to how significant a factor it will be. Once more, this may be due, in large part, to the age of the students, probable lack of work history, and beliefs about the difficulty of finding work rather than a past record of actual employment experience.

The ethnic minorities in this study are under-represented in relationship to the state's general college going population, while Caucasians are over represented. Although, to some extent, this may be due to differing cultural responses to disabling conditions, the observed pattern of minority under-representedness of students with disabilities is consistent with the under-representedness of ethnic minorities in the community college system in general (Kanter, 1989).

It is also interesting to observe that while the majority of disability conditions occur prior to age eighteen, (the mean age is 11.5 years with most disabilities occurring at birth), for most students in this study, the High Tech Centers will probably be their first exposure to both computers and computer access technologies. The majority of persons in this study will have passed through the most critical years of their education without access to computers.

o Characteristics of Students by Type of Disability

The data in this study were analyzed to determine if any demographic characteristics, patterns of educational history, academic goals, or levels of program satisfaction were unique to a particular disability group or groups.

Students in this study who have learning or physical disabilities are predominantly between eighteen and thirty-four years of age with the majority of students ranging form eighteen to twenty-four years of age. The "bulge" in the eighteen to twenty-four year old age range is common to the majority of disability types considered in this study. This may reflect expanded efforts made over the last ten years by state and federal agencies to improve educational and college transfer opportunities for students with disabilities in the K-12 systems.

The population of blind or low-vision students in the sample are generally older. This suggests that their disabilities were acquired later in life perhaps as a result of a progressive disorder. Although this seems particularly true of blind students, students with low-vision appear to be equally divided between "typical" college age students and older adults.

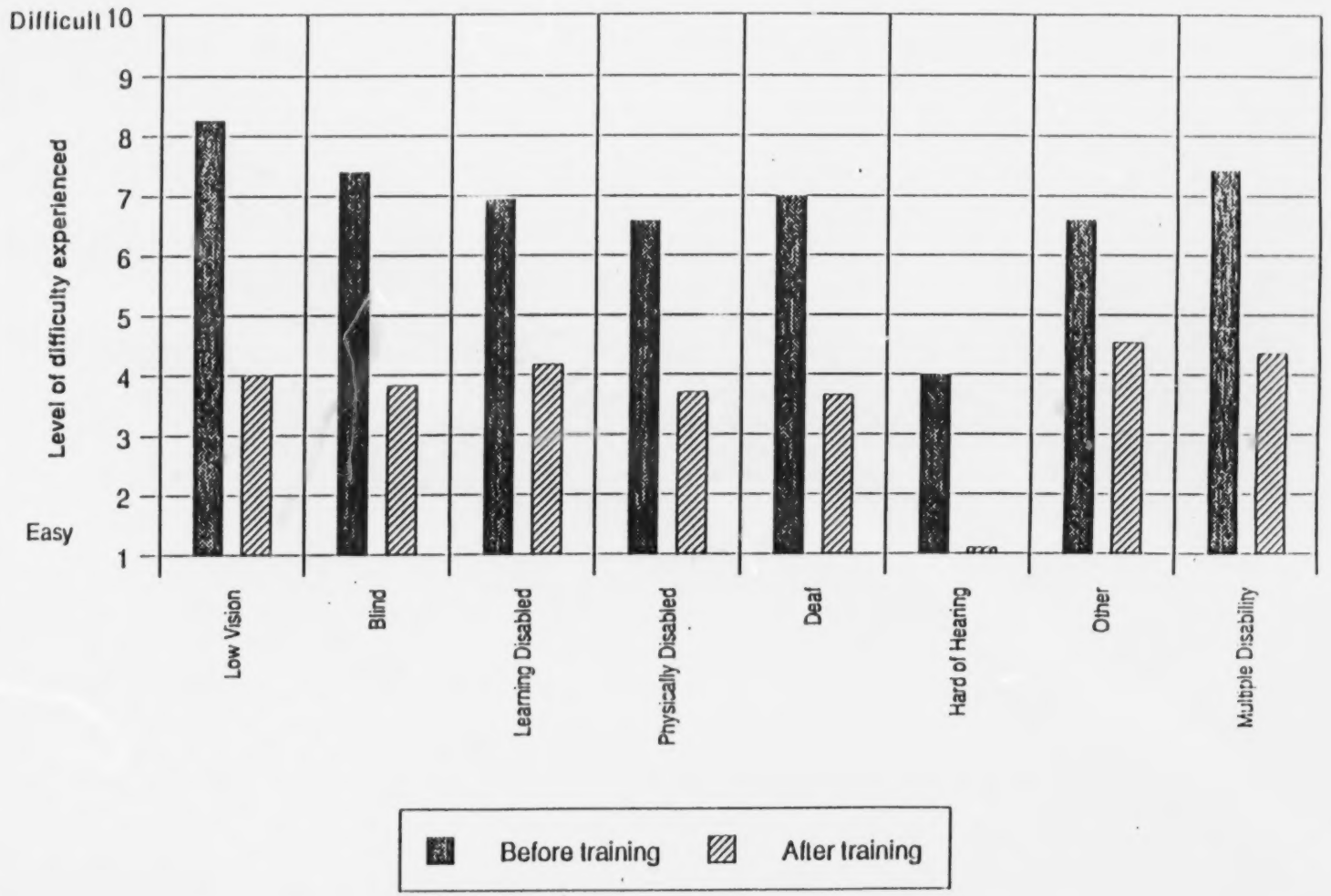
Across all ethnicity groups, learning disability is the single most common disability type. Although the sample size for Hispanic and American Indian students in this study is relatively small, these two groups appear to have unusually high percentages of learning disabilities in relationship to the total group of students with disabilities in this sample.

Physical and multiple disabilities are, respectively, the second and third most common disability types across all ethnicity groups. With sample sizes of ($n < 4$) excluded from the analysis, Black students have the highest percentage of physical disabilities while Asian students have the highest percentage of multiple disabilities. Asian students in this study also have dramatically higher percentages of low-vision and blindness than any other ethnic group.

No clear patterns emerge with regard to educational goals by type of disability. It appears that the students in this study are virtually indistinguishable from the general group of community college-going students in their educational goals although a somewhat larger percentage of students with disabilities are enrolled in courses of personal interest. This "personal interest" group may well represent the population of older adults who frequently qualify for enrollment in the High Tech Center program.

With regard to improved ease of computer use after the High Tech Center training, major gains were made by all disability types. Low-vision and blind students report the greatest gains in ease of computer access followed next by students with physical and then learning disabilities. This is due most likely to the specificity and sophistication of access systems for low-vision, blind, and physically disabled versus the more generalized types of computer access systems available for students with learning or other types of disability. (See figure 7.)

Figure 7: Ease of computer use before and after High Tech Center training.



Although all disability groups report high levels of confidence in their ability to use special access systems, again, low-vision, blind, physically, and learning disabled students report the highest levels of confidence. This is, perhaps, a powerful indicator of the effectiveness of computer access systems which have been designed to meet the specific needs of particular disability groups; specially low-vision, blind, and physically disabled.

In responding to the question of the perceived effect their disability will have on opportunities for employment, students in each disability group have quite distinct opinions.

Persons with multiple disabilities strongly agree that their disability will have a considerable effect on opportunities for employment. In analyzing the responses of this group across the entire number of students in this study, it is evident that although gains have been made, these gains were not as large as those of other disability groups. The actual and perceived disadvantagement of this group is clearly higher than that of other disability groups. Many members of this group may severely as well as multiply disabled. These results suggest that community colleges and other agencies which serve the multiple disabled may want to expand counseling and related transition-to-work services for these individuals.

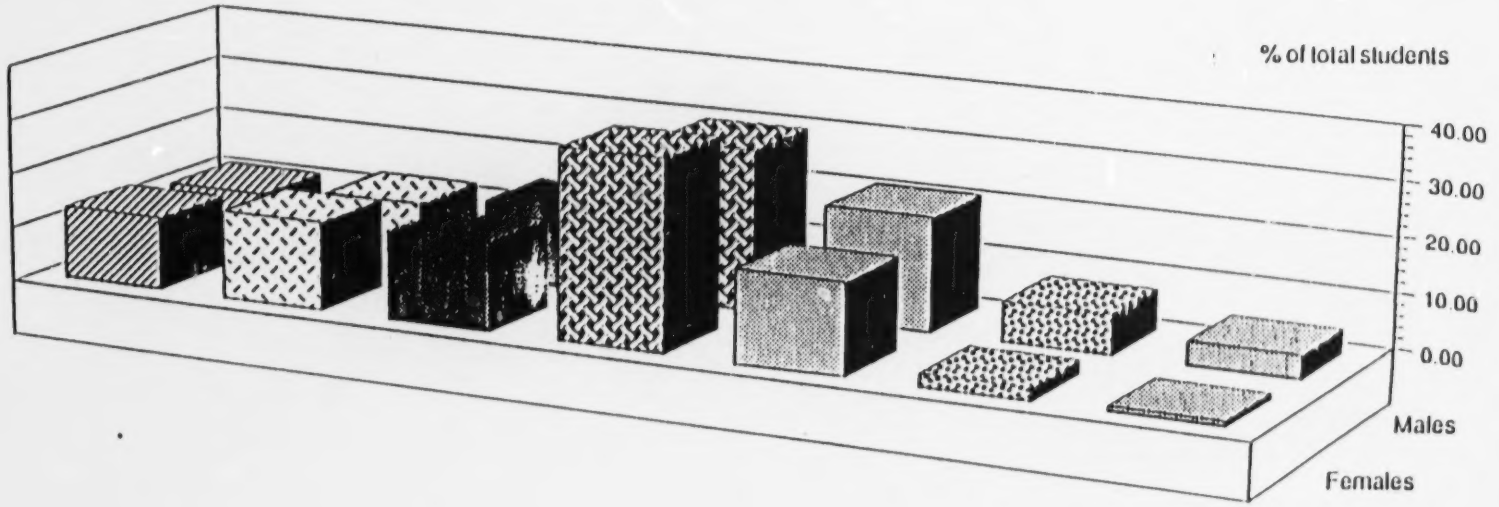
At the opposite end of the spectrum, students with learning disabilities expect to experience relatively little impact of disability on opportunities for employment. There very well may be a relationship between the visibility of the disability and the student's perceived effect of the disability on opportunities for employment. Whereas students with "invisible" disabilities such as learning disabilities, deafness, diabetes, respiratory, or heart conditions perceive their disabilities to have little effect on opportunities for employment, students with highly visible disabilities such as physical, visual, or neurological limitations (either singly or in combination) anticipate much more impact on employment opportunity.

o Characteristics of Students by Gender

Although evaluation of the data by gender reveals a fairly even distribution of men and women across disability groups, a slight tendency towards males with learning disabilities can be observed. This is consistent with gender distribution findings of students with learning disabilities in other studies. In regard to low-vision and blind students in the sample, even though females with visual disabilities outnumber males by nearly two to one, the small sample size may account of this finding.

A much more important finding concerns major differences in the grade levels at which males and females with disabilities were first introduced to computer. Whereas thirty-two percent (32%) of males had been introduced to computers before the twelfth grade, only twenty percent (20%) of females had been similarly introduced - a twelve percent (12%) difference. At such a critical period in the educational process, this could represent a major obstacle to future academic performance. (See figure 8.)

Figure 8: Grade level first introduced to computers.



Between K and 6th grade
Between 7th and 8th grade
Between 9th and 12th grade
Between grades 13 and 14
After grade 14
Other
Never

For the disabled males and females who received an introduction to assistive computer technology prior to high school graduation, twelve percent (12%) were males and ten (10%) were females. Proportionally, fifteen percent (15%) fewer females than males had access to assistive computer technology prior to high school graduation. These findings suggest that females appear to be at a disadvantage in that fewer are introduced to computers and computer access during their high school years. The low incidence of computer exposure (specially for females could have serious impact on subsequent educational preparation and performance. (See figure 9.)

What is evident from this study is that the majority (at least 60%) of male and female students with disabilities receive their first introduction to both computers and assistive computer technologies in a community college setting and most likely at a High Tech Center for Disabled.

This study reveals a tendency for disabled females to enroll in vocational track or employment related courses more frequently than males. Also disabled females appear less likely to enroll in courses leading to transfer to four year degree programs than disabled males. These findings suggest that colleges may want to provide additional counseling directed at disabled females entering college for the first time. It is also possible that this study may be identifying increasing numbers of older disabled females returning to college for retraining or to improve job skills.

In examining ease of computer use for males and females before and after the High Tech Center training, females report considerably higher levels of difficulty with computer use than males before training but greater ease of computer use than males after training. Initial high levels of difficulty in disabled females may be due in part to lack of exposure to computers in the K-12 system. (see figure 10.) Increases over disabled males in ease of computer use after training remains unexplained and may be investigated in future studies of this type.

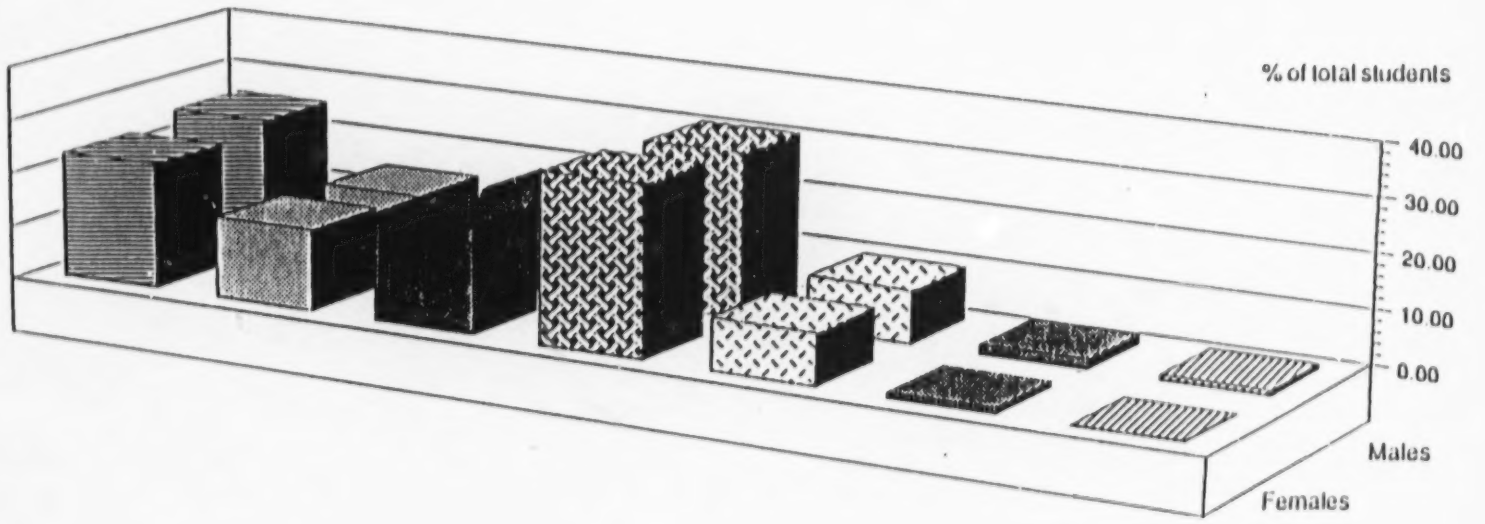
Males and females appear to differ only slightly in regard to their high levels of confidence in the ability of High Tech Center staff to select appropriate assistive computer technologies, a moderately strong belief in the importance of computer access to help with graduation from college, and a moderate belief (with females slightly more uncertain than males) that disability would affect opportunities for employment.

o Conclusions

In some respects, what is most striking about the students in this study is their similarity to able-bodied community college students. Their ages, ethnicities, and educational goals are virtually indistinguishable from the overall statewide population of non-disabled, community college going students.

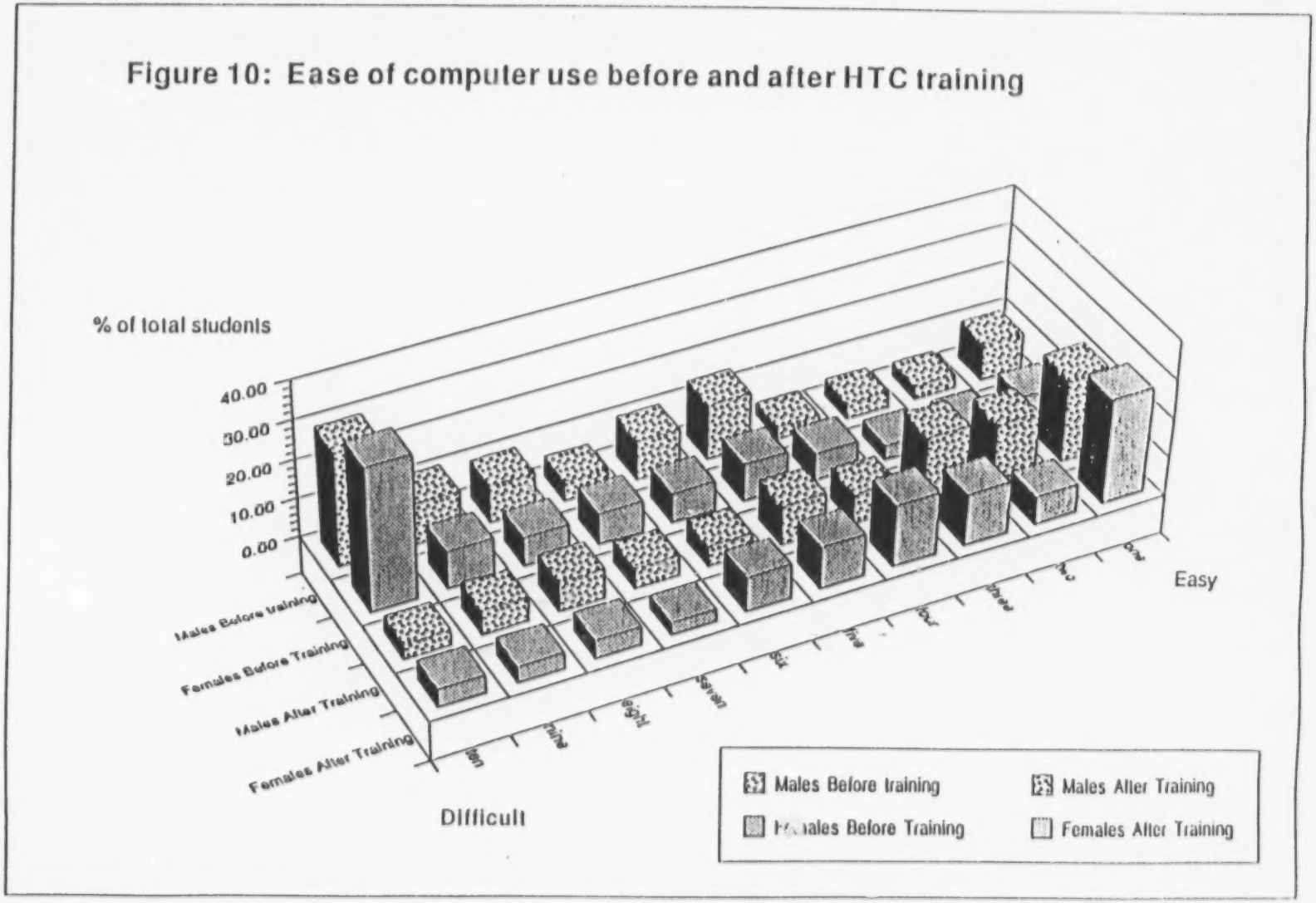
As is the case on many community college campuses, disabled ethnic minorities remain seriously underrepresented even as subsets of minority populations on campus.

Figure 9: Grade level first introduced to computers with access.



Between K and 6th grade
Between 7th and 8th grade
Between 9th and 12th grade
Between grades 13 and 14
After grade 14
Other
Never

Figure 10: Ease of computer use before and after HTC training



Although a higher percentage of disabled than non-disabled students enroll in community college courses for personal interest or other reasons, this is consistent with the goals of older adult populations participating in programs for students with disabilities as well as the "life-long learning" offerings on many community college campuses.

The perceived impact of disability (particularly highly visible disability) on opportunities for employment appears as a real and troubling issue for students in this study. The effects of this perception may have a strong impact on the vigor with which such students work to prepare themselves to become employable. High Tech Center training may help to increase a student's confidence in his/her personal and professional marketability and thus reduce the negative impact of such perceptions on the academic performance of students with disabilities.

Students participating in the High Tech Centers program appear to have great confidence in the professional ability of High Tech Center instructional staff. Across all ethnic, gender, and disability groups, students make substantial gains in the ease and confidence with which they can use microcomputers. These gains should be readily observable in future students as they are translated into improved academic performance, higher rates of transfer to four year colleges, and enhanced job placement over the coming years.

The California Community Colleges' program of High Tech Centers for the disabled appears to play a major role in introducing persons with disabilities to both computers in general and computer access technologies in particular. For the overwhelming majority of students in this sample, ranging from eighteen to thirty-four years of age, the High Tech Centers will most likely provide their first opportunity to learn both computer usage and the operation of computer access technologies. This is a tremendous responsibility as well as an enormous opportunity for the High Tech Center programs.

California's rapidly changing demographic make-up points unflinchingly towards a tomorrow in which the unique characteristics and needs of diverse ethnic and social groups will be the norm rather than the exception. Within this rapidly changing structure, there exists an unprecedented opportunity for persons with disabilities to establish a claim on the availability and shape of a computer technology which will sculpt the future of our lives into the far distant future.

2. Satisfaction Levels of California Community College Faculty With Training and Support Provided by the High Tech Center Training Unit

One of the most critical elements in the development of this new High Tech Center resource has been the training of instructional specialist in the use of hardware and software based assistive computer technologies. More than two hundred specialists have participated in training(s) at the High Tech Center Training Unit. In order to critically evaluate trainee satisfaction with the ability of High Tech Center instructional staff to present complex technical information in a clear and understandable manner, answer questions completely, establish effective instructional time frames, and teach at a pace which is "just right," an outcomes study was conducted.

In order to develop such information, this study examined the entire population of instructional specialists who completed training courses at the High Tech Center Training Unit between April of 1987 and September of 1988 (n=214.) Data for this study was gathered from post-training evaluation questionnaires.

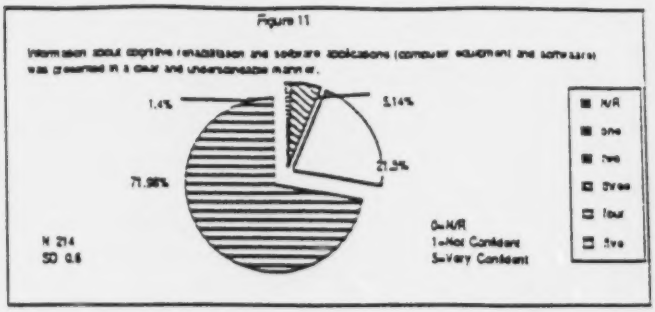
This descriptive study proposed as its research question: "What is the level of satisfaction with training received by instructional specialists who completed courses at the High Tech Center Training Unit?" The characteristics to be examined included: training content, training format, trainee future needs, and trainee confidence levels.

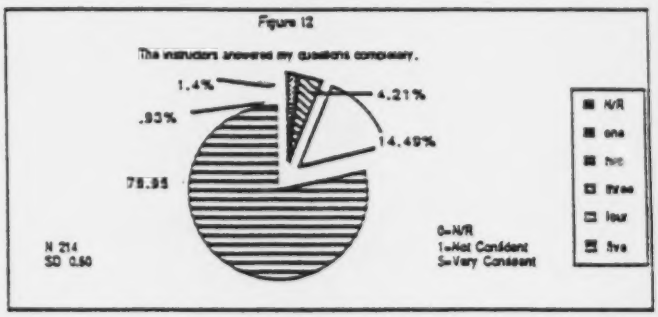
In summary, the data collected revealed that faculty are very satisfied with the capacity of the program's staff to communicate information about complex technical matters in a clear and understandable manner.

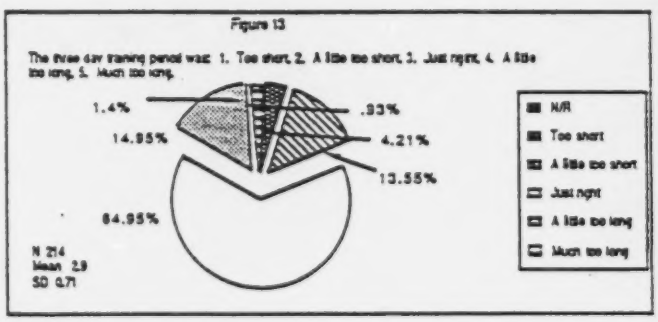
Participants were also well satisfied with the fashion in which their questions were answered during the training process (See figures 11 & 12.)

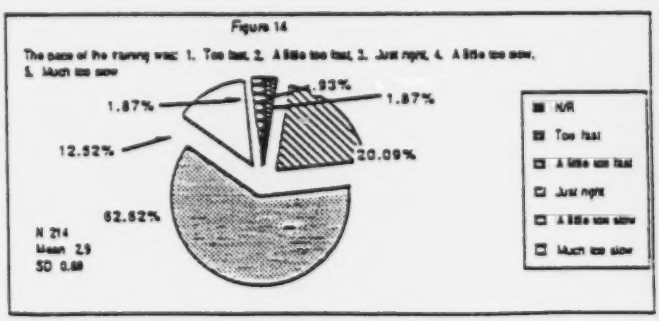
Although the majority of participants were satisfied with the length and pace of the training, approximately 18% reported that the training period was a little too short, while another 20% reported that the pace of the training was a little too fast. These responses have been taken into account and are reflected in the altered pace of present High Tech Center trainings. (See figures 13 & 14.)

The data clearly indicated that the great majority of participants wanted additional training and anticipated needing moderate to substantial levels of support and assistance. Providing the depth of training requested has required development of several new training programs through the Sacramento center, regional trainings around





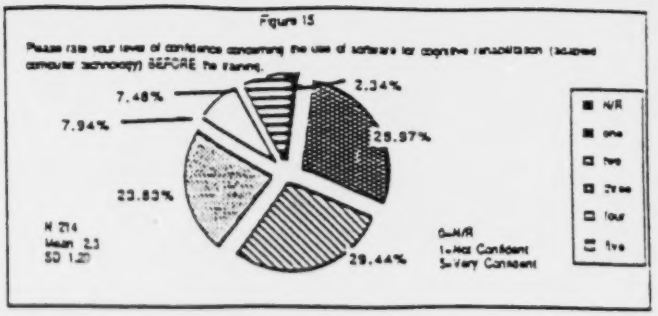


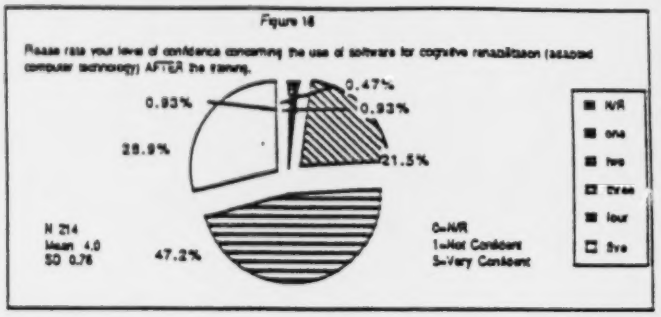


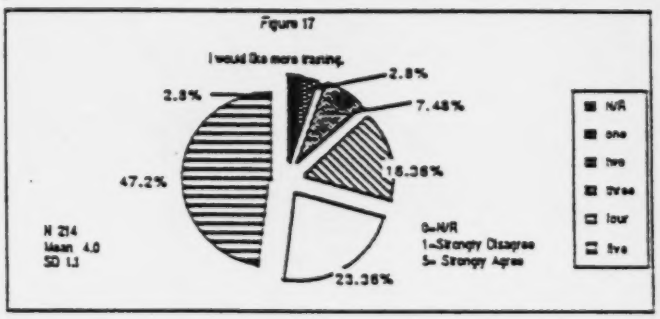
the state, and a mechanism for refresher/follow-up trainings as new technologies have become available. (See figures 15 & 16.)

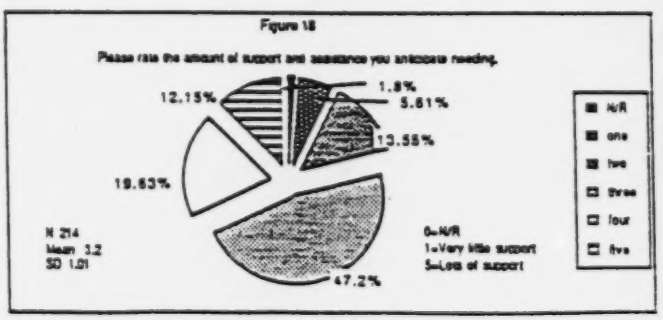
Perhaps the most significant finding of this study was the dramatic increase in participant confidence levels before and after training. While only 15% reported feeling quite confident in their ability to use assistive technologies before training, 76% reported feeling quite confident after training. It was also reassuring to note that more than 97% of participants reported very high levels of confidence in the ability of High Tech Center staff to provide the levels of future support and assistance trainees anticipated needing. (See figures 17, 18, & 19.)

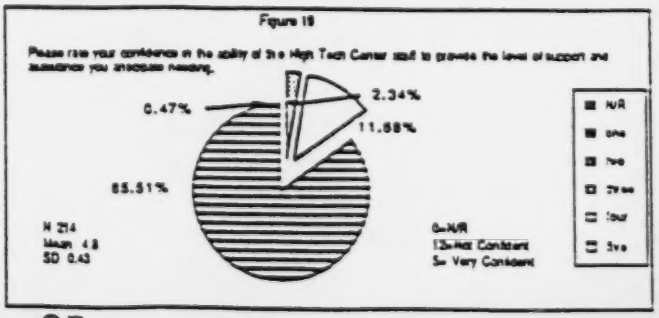
Community college faculty appear to be very pleased with the quality and level of training and support delivered by High Tech Center staff. The training methods employed by the High Tech Center are working well and have benefitted from the modifications suggested by this study. Trainees are confident in their ability to use what they have learned, very interested in additional training, and extremely confident in the ability of High Tech Center staff to provide support and assistance.











The High Tech Center Training Unit provides a variety of support services for community college faculty:

o training opportunities

In order to improve the skills of existing specialists and build foundation skills in new faculty members, the High Tech Center offers more than fifteen training workshops covering all aspects of assistive and instructional technologies. Workshops range in duration from one to three days and are offered throughout the year. Workshop subjects arrange from three day trainings in the basics of assistive computer technology to advanced trainings in the use of cognitive retaining software for students with acquired head injuries. To date, the Center has provided such training for more than four hundred participants.

o telephone support

A significant fraction of each working day is devoted to providing direct support to faculty at community college High Tech Centers across the state. The bulk of this support is provided over the telephone. The Center provides support in a wide variety of areas including: evaluation of student access needs, instructional methodology, course development, equipment purchase, integration of assistive technology with campus computer networks, equipment maintenance and repair, software integration, current legislation related to computer access, availability of new technologies, and funding opportunities.

o site visits

Over the last two years, Training Unit staff have visited each of the community college High Tech Center sites at least once. These visits will continue as a regular part of program operation. They represent a welcome opportunity on the part of college faculty to receive personalized assistance with computer usage and access issues unique to their campus. These visits also allow High Tech Center Training Unit staff to continually monitor the effectiveness of overall program operation.

o regional meetings

Each year, the High Tech Center sponsors regional meetings of community college High Tech Center specialists in Northern and Southern California. These meetings provide an opportunity to discuss and develop policy related to assistive and instructional computer technology, share new information, plan for the coming year, explore innovative new technologies, evaluate new instructional methods, and acknowledge the achievements of High Tech Center faculty.

o in-service trainings

Once each year, the High Tech Center sponsors an in-service training opportunity for community college High Tech Center faculty. These opportunities provide learning experiences which are beyond the scope of the High Tech Center Training Unit at the Chancellor's Office.

In December, 1989, more than fifty faculty attended a day-long workshop at Stanford Children's Hospital Rehabilitation Engineering Center. The workshop focused on highly specialized assistive computer technologies for the severely disabled, a student population not adequately served by High Tech Centers at the present time.

o electronic communications

The Training Unit maintains an electronic bulletin board system (CC:) which provides information exchange, software updates, and electronic mail to every community college High Tech Center location. Through High Tech Center Establishment Grant funding, modems and communications software were provided to each of these sites as well. The system is available to all community college DSP&S faculty and is presently being used regularly by more than sixty-five colleges. Recently, the system was modified to provide an area which allows students enrolled in High Tech Center programs to communicate with their peers across the state.

The Sacramento based High Tech Center Training Unit has produced a series of publications intended to improve the ability of faculty in post secondary education to better understand and deliver assistive computer services for students with disabilities.

o books

Through a grant from the United States Department of Educations Fund for the Improvement of Post-Secondary Education (FIPSE,) the program's coordinator has written and published two books. Computer Access in Higher Education for Students with Disabilities, Volumes 1 and 2, deal extensively with the instructional, technical, and legal issues of computer access for students with disabilities. Several thousand copies of the book have been distributed at no charge to over one thousand of the nations largest colleges, state and federal legislators, and the CEOs of the nations leading corporations. Additionally, college presidents and DSP&S coordinators in each of California's three public segments of higher education (University of California, California State University, and the California Community Colleges) also received copies. The work has been adopted as a reference text by the federal government and is generally regarded as a national standard for guidelines in assistive computer technology.

o training guides

In order to assist faculty in making maximum use of the trainings available through the High Tech Center, a comprehensive series of training guides have been developed. Individual training guides have been produced for each of the more than seventy-five assistive, productivity, and basic skills software programs employed by the Center. These guides are provided during High Tech Center trainings or sent to faculty upon request.

o instructional guides

In cooperation with High Tech Center specialists from community colleges across the state, and the DSP&S Unit of the Chancellor's Office, the High Tech Center Training Unit has developed a six-hundred page, three volume instructional guide. The guide provides a complete curriculum and supporting lesson plans, exercises, and examinations for all major instructional components of the High Tech Centers program. This guide has been distributed to all community college High Tech Center sites and to other California community colleges upon request.

o electronic publications

All published materials are also available electronically on the CC: bulletin board system. Additionally, the High Tech Center maintains an up-to-the-minute database of all assistive technologies it employs using Apple Computer Corporation's Hypercard software. This database is also distributed to all High Tech Center Locations.

The High Tech Center Training Unit has undertaken a number of cooperative agreements with private industry, other post-secondary institutions, and government intended to increase the access and success of students with disabilities enrolled in California community colleges.

o cooperative agreements with private industry

In order to explore the capacity of students with disabilities to work productively in the area of computer assisted design (CAD,) in cooperation with the Autodesk Corporation, selected community colleges, and participating local employers, an innovative new project has just begun. Community college faculty form the CAD, DSP&S, and High Tech Centers, students with disabilities, Autodesk staff, and community employers will work cooperative to create a training program which incorporates the best methods for teaching and using CAD products along with the most advanced assistive computer technologies available. It is anticipated that participating community employers will agree to hire students who successfully complete the course and pass the CAD certification test designed by Autodesk.

o cooperative projects with government

The Training Unit is a consulting member of panels formed by the National Science foundation (NSF), the American Association for the Advancement of Science (AAAS), the United States Government's Clearinghouse on Computer Accessibility (COCA), as well as the President's and Governor's Committees on the Employment of Persons with Disabilities. The techniques and guidelines developed by the High Tech Center played a part in shaping both the Federal 508 regulations concerning computer access for persons with disabilities, and the Federal Technology Assistance Act for persons with disabilities.

o cooperative projects with other post-secondary systems

Over the last three years, the High Tech Center has worked closely with colleges from both the University of California, and California State University systems in helping these institutions provide the levels of assistive computer technology available in most California community colleges. The High Tech Center has also provided information and support to several states (Oregon, Washington, Hawaii, Florida, New York, Massachusetts, Connecticut, Colorado, Arizona) wishing to begin programs based on the California community colleges model.

All of these services are available at no charge through the High Tech Center Training Unit to qualified faculty or administrators from any California community college.

SUMMARY AND CONCLUSIONS

The California Community Colleges High Tech Centers program is about to enter its fourth year of operation. Student enrollment has grown steadily with may colleges now forced to use waiting lists for students wishing to participate. Each year, additional community colleges which did not receive High Tech Center grants have taken steps to provide disabled students with access to computers through small "start-up" High Tech Center sites. Anecdotal information collected from several colleges suggests that students with disabilities are experiencing significant gains in academic performance and mainstream participation as a direct result of access to assistive computer technologies. Community college faculty are uniformly enthusiastic and supportive of the program in large measure because of the dramatic gains in academic performance, transition to mainstream courses, and enhanced self esteem they have seen in their students.

The High Tech Centers program is an appropriate, and effective, response to the mandates and guidelines established under Section 504 of the Rehabilitation Act, AB 77, AB 746, and AB 1725 with regard to equal access, supportive services, improved access to technology, and outreach to underrepresented students. Additionally, in light of the recently enacted amendment to the Rehabilitation Act of Section 508 mandating the accessibility of computer system in Federal agencies by all persons with disabilities, it is reasonable to assume that like Section 504, Section 508 will be found applicable at the State level as well.

The California Community Colleges Chancellor's Office program of High Tech Centers for the Disabled has been, by any standard, enormously successful. Both concrete and anecdotal data suggest dramatic gains in student performance. Faculty in the Disabled Students Programs and Services units of California community colleges are genuinely excited and enthusiastic over the very real improvements they are seeing in High Tech Center students on a daily basis. The High Tech Center program and the resource materials it has produced are now the national standard against which all other programs are measured or modeled. In a very real sense, the High Tech Center program has played a major part in shaping national policy with regard to equal access to computers and awakening post-secondary education to the expanded opportunities available to persons with disabilities through the use of assistive computer technology.

The California Community College system leads the nation in guaranteeing access and opportunity for students with disabilities. Maintaining that lead will require innovation, commitment, and a sincere desire to provide equal educational opportunities through which students can succeed on the basis of their own merits rather than falter on the circumstances of their disability.

"STUDENTS WITH DISABILITIES, RIGHTS AND RESPONSIBILITIES IN EDUCATION"

Presented by

Jay Brill
Technology Related Assistance Project
Governor's Office on Handicapped
300 W. Lexington Street
Box 10
Baltimore, Maryland 21201

STUDENTS WITH DISABILITIES
RIGHTS AND RESPONSIBILITIES IN EDUCATION

Over the last 15 years, sweeping changes in education for people with disabilities have been brought about by people with disabilities, their families, and other advocates.

Thirty years ago, there were special segregated schools for people with severe disabilities. Some were schools segregated by disability if a child was "lucky" enough to get in. Many children received only home teaching or no formal instruction at all - except as provided by their family. Worse yet, sometimes, "well meaning" professionals recommended institutionalization from birth, effectively ending all hope of a normal integrated life, let alone obtaining an education.

Students with less severe disabilities were often treated as square pegs in round holes, and moved through the system, not getting the assistance they needed to learn, but just being passed along until they exited, graduated but not educated.

After suffering years of arbitrary injustice and discrimination, parents advocated for access to education for all children with disabilities.

PL 94-142 the Education of the Handicapped Act, was the result, School Districts were dragged-kicking and screaming, with the help of congress into serving students with disabilities. Since 1975, increasing numbers of students have been included in public education, and they are feeding into the post secondary system. Many use technology to assist with speech, hearing or in communication and will have lifelong needs for assistive technology to assist or augment communication and personal independence.

These are students who need to keep or upgrade both skills and technology as they transition from one educational placement or service sector to the next. To do this effectively, both students and their families need to become effective self-advocates and informed consumers of educational and technological services.

In the past, parents have been the primary consumers and advocates to move children into the primary/secondary education system, and this works relatively well in the primary grades. I am often surprised at how well it does work. My son, age 8, is in the third grade in an LD program, and in the gifted program as well. I have turned into one of those parents that the school hates to see coming. This year, my son, at age 8, after careful preparation and coaching, was the first third grader in his school to participate in his IEP meeting.

Why put an eight year old through an IEP meeting? Because he won't be eight forever. Parents cannot remain the primary "consumer/ advocate" during the secondary process, because, after secondary school, the rules change!

After age 18, the student, by law, must be responsible for him or herself. Most college programs will not even talk to parents without written permission from the student. From birth through the end of high school, education is an entitlement, and schools are charged "to identify and to serve". After high school, in the world of post secondary education, the key concept is nondiscrimation and self-advocacy is needed to succeed.

When we discuss Section 504 vs. PL 94-142, the issues are entitlement vs. nondiscrimination, but the discussion can also be cast as protection vs. consumerism.

How do people with disabilities learn to be effective consumers after 18 years of being "helped to be helpless?"

One of the most exciting new priorities of the Department of Education is in the area of "self-determination" empowering the student with a disability to be an informed consumer, able to make appropriate choices on his or her own. Why is this needed? According to Richard Harris, first president of the Association of Handicapped Student Service Programs in Post Secondary Education, "We have raised an entire generation of kids with disabilities who know nothing except how to let the resource teacher do it". We have created an entire generation of young people who are not taught how to cope with the "real world" but are carefully insulated from failure inside the special education system, and conditioned to expect this insulation to continue throughout life!

As we have been sending students through the educational system, pointing them at opportunities after high school and hoping for success, post secondary education has evolved to meet their needs.

Being a student with a disability before 1977 was an exercise in creativity and endurance. From World War II to the middle 70's, before Section 504, obtaining an education was as much a matter of luck as it was of ability. Often students needed to pass a physical exam for access, proving their ability to negotiate the campus using a wheelchair.

One major university had an outright ban on students who needed personal care services, and often, admissions was at the whim of a entry level counselor, whose stereotypes of disability coloured admissions for their college.

Most colleges had one or two blind students, or wheelchair users, and thought they were doing a great job if they had a handful of "good" handicapped students. However, students with communication impairments, or Specific Learning Disabilities or any severe disabilities were not thought of as "college material" and were generally denied admission based on the prejudice of admissions officers.

The rules changed on May 4, 1977, with the signing of the Section 504 regulations which banned discrimination on the basis of handicap in federally funded programs. Section 504 had had its greatest impact in the Higher Education community. The nondiscriminatory access provisions of Section 504 have changed both the physical and attitudinal landscape of academia.

In 1976-77, the Higher Education establishment was the largest single opponent of the 504 regulations. According to one officer at the University of Missouri-Columbia, who stated in Congressional hearings that because of Section 504, "we will build facilities that will never be used". Today, there are 1.3 million college students with disabilities.

In 1978, only 2% of all freshman reported having a disability, and no data was available as to other students with disabilities after the freshman year. In 1986, over 10% of college students report having one or more disabilities. A total over 1.3 million college students with disabilities at all educational levels, according to 1986 figures from the U.S. Department of Education.

Moving from severely restricted access at a few colleges in the early 70's to over 10% of the nation's post secondary student body is the midpoint of a long journey, a journey begun in the sweat and tears of parents, on behalf of their children which led to the enrollment of over 4 and one half million students with disabilities in our primary and secondary systems. The journey continues with the efforts of people with disabilities, especially students with disabilities, and had led to open access at most colleges and universities, evidenced by ever increasing enrollments as campuses increasingly target the "non-traditional" student.

According to the U.S. Department of Education's 9th Annual Report to the Congress on Public Law 94-142, there are over 180,000 students exiting secondary education each year, seeking additional training to become productive members of the workforce. Each of these students has the right to obtain education or training to help them participate in the American workforce, either through their own efforts, or with the assistance of an educational or rehabilitation agency.

These young people with disabilities have rights, and with rights come responsibilities. Foremost among these is the responsibility to be a self-advocate, along with the responsibility to work in cooperation with college or other training programs to utilize scarce resources well.

In addition youth with disabilities have a responsibility to keep the focus on their abilities rather than on their disabilities, and a responsibility to deal effectively with those who see their disabilities first rather than their abilities.

Within the educational community, we have a responsibility to provided the tools for effective self-determination; 1) the skills to become self-advocates; 2) the opportunities to use those skills in preparation for the transition to life after high school and 3) the opportunity to learn to cope with both success and failure. If students with disabilities leave high school with the skills and abilities needed to enter post secondary education prepared to live as independently in the world as other students, we as educators prepared them effectively. We will not have done our job.

The students of today, our workers of tomorrow will need all the skills for self advocacy that we can teach them; better able to move in new directions through the 90's and into the changing workforce of the 21st century.

Over the last one and one-half decades, the rules for people with disabilities have changed several times. In 1975, parents put their children into mainstream education, and became consumers and advocates on behalf of their school age children.

In 1977, students with disabilities advocated for independence on campus, using sit-ins, marches, media events, and all of the tools of the civil rights movement.

Two years ago, at Gallaudet University in 1988, we saw the rules change for the third time as people with disabilities took control of their campus.

In 1989, Section 508 of the Rehabilitation Act of 1973, as amended in 1986, took effect. Section 508 requires all computers in the federal workplace to be accessible to persons with disabilities, either immediately "out-of-the-box" or via adaptive aids. Industry response to Section 508 has resulted in more tools for people with disabilities, for example, Apple's Easy Access and Close View which increase access to the screen, mouse and keyboard for individuals who have limitations in vision or dexterity. Such tools, included as free utilities with every Macintosh making more computer accessible without any additional modifications. Such software based responses to Section 508

are of benefit to both educators and employers inside and outside of the federal sector as increasing numbers of people with disabilities move through education and training into the workforce.

When Section 508's mandate for hardware access is leveraged with the Section 504 nondiscrimination mandate students with disabilities are the winners. Section 504 ensures nondiscriminatory access to any campus computer as part of the normal college experience. This is of vital importance, as many campus departments now house some type of computer lab for coursework. Computers equipped with speech, braille, large print output devices allow students who are visually impaired or blind to take accounting (or other courses) using the same software as their peers. In addition, devices such as the "head-mouse" or speech synthesizer provide students with disabilities equal and independent access to coursework and labs.

For example, a student whose disability prevents him or her from speaking or writing can receive a computer communication aid to produce synthesized speech to communicate with teachers and classmates. If the student's disability prevents him or her from writing with a pen or pencil, that computer can also be used as a word processor, thus eliminating the need to hold a pencil. Students with dyslexia can use computers to write a composition, run a spell-check, and to read the composition aloud, reinforcing weak reading skills.

While Section 504 has required colleges and universities to provide equal access to computing since 1977, the impetus of Section 508 has proven to be the key to creating meaningful access.

The Minnesota STAR Project, cosponsoring this conference is a program funded under what could prove to be a pivotal program for technology access by persons with disabilities. PL 100-407, the Technology-Related Assistance for Individuals with Disabilities Act, is designed to help states to inform persons with disabilities about the potential impact of technology on their lives, and to provide the mechanisms to put assistive technology into their hands. The act allows all fifty states to establish programs so that persons with disabilities have access to appropriate technology from pre-school through retirement. Each state program will provide a different set of services, tailored to the state's needs. As the concepts of consumer access to technology take root, all 50 states will begin sending technology-literate people with disabilities into the work force of the future. According to the landmark Hudson Institute study "Work force2000", the future workforce will include many more persons with disabilities.

The Federal Government, working to recruit and retain persons with disabilities in the federal work force, uses Section 508 to protect its investment in human capital, and to prepare for the work force of the future. However, both private industry and higher education, seeking to be non-discriminatory under Sections 503 and 504, are increasingly using the specific guidelines of Section 508 to define computer access for persons with disabilities.

The Americans with Disabilities Act (ADA), a civil rights bill that has passed the Senate and is expected to pass the House of Representatives in the next two weeks, will further expand rights and open employment options for people with disabilities and create further markets for "accessible computing". As people with disabilities continue to join the work force, a legal structure is being built to ensure that not only will people with disabilities know how to use technology, but that there will be an installed base of usable technology waiting.

Quick Reference to laws in this paper.

PL 94-142 (Education for All Handicapped Children Act) provides free and appropriate education for children with disabilities.	Special technology for communicating, or doing for a classwork is often provided as a part of the Individualized Educational Plan mandated by the law.
Section 504 of the Rehabilitation Act of 1973 (as amended).	Requires that any recipient of Federal funding not discriminate on the basis of disability. Individuals served by recipients must provide equal access to all services and programs offered including computer labs or jobs requiring use of a computer.
Section 503 of the Rehabilitation Act of 1973 (as amended).	Requires than any Federal contractor for sums over $2500 not discriminate on the basis of disability. Individuals employed by covered contractors must not discriminate against qualified handicapped people for any position including jobs requiring use of a computer (with or without modifications to the computer).
Section 508 of the Rehabilitation Act of 1973 (as amended).	Requires that all electronic office equipment purchased by the Federal Government (including computers) be usable by "end users with disabilities".
P.L. 100-407, the Technology-Related Assistance for Individuals with Disabilities Act.	Funds State-Wide, consumer responsive projects to provided assistive technology to person with disabilities (states receiving these funds are required to comply with Section 508 (above) after the 4th year of the project).

Additional Resources:

P.L. 100-407, the Technology-Related Assistance for Individuals with Disabilities Act
Carol Cohen, Project Officer
NIDRR
400 Maryland
Mes 3420
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202-732-5066

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College Access to Computing
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University of Missouri-Columbia
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"LOW" TECHNOLOGY ASSISTS TO HIGHER EDUCATION

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Radisson Hotel
Minneapolis, MN
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In this presentation, "low" technology is defined as devices and ideas for their use that are not entirely electronic or computer-based. The persons who will be considered are those who have physical disabilities. Many of these assists are commercially-available products while others are simply common-sense solutions. Some technology discussed in this presentation can optimize both vocational and educational environments.

Successful use of "high" technology, such as computer systems, is often enhanced through the simultaneous use of some low technology. For example, it is critical that a person can physically access an area in which they plan to work or study. In addition, the design of an individual's workspace can greatly influence work efficiency, energy endurance, and independence.

A wide variety of these "low" technology assists are discussed in this presentation, as well as some suggested resources for their procurement. The additional resource list, "Computer Desks and Workstation Designs Resources", was compiled by Susanne H. Shealey, OTR occupational therapist at the Communication Enhancement Center of Children's Hospital, Boston.

Environmental Access

Students and faculty with physical disabilities must first have physical access to the environment in which they will study, teach and work. Although this may not be necessarily considered "technology", it is briefly included. Architectural barriers that need to be addressed include curb cuts, sufficient door widths, and furniture layout. Automatic doors are optimum for independent access by wheelchair users. Doorknob extensions greatly ease door opening by persons with muscle weakness or limited range of movement.

Attendants or peer "helpers", offered by some school programs, can provide assistance in many areas; however, it should be noted that a person may prefer independence over this option.

Workspace Design

A person must have physical access to their work and study space. Independent access is obviously ideal and should be thoroughly explored. The design of a desk or workstation can maximize this independence. Many designs of workstations have evolved in recent years. Most of these were designed and marketed toward the non-disabled population, but these design features can offer advantages to all persons. Some resources of commercially-available desks and workstations are provided in the attached "Computer Desks and Workstation Designs Resources" listing[1].

Postural support for any person at a desk should provide an adequate level of comfort and support. Persons with physical disabilities may need additional support to optimize work efficiency and comfort, as well as minimizing energy expenditure. Raised resting supports for arms and elbows[3] can decrease energy needed for tasks such as keyboarding. For wheelchair users, trunk and head/neck support can improve performance for some people. For non-wheelchair users that will be seated in front of the computer for long periods of time, there are a wide range of commercially-available posture chairs designed to increase support for the back, arms and/or neck.[1]

Layout of work on a desk or work surface can also influence work efficiency and resultant fatigue. For persons with very limited mobility, the items of highest use should be within very close reach and visual access should be available to all materials. If slipping is a problem, non-slip materials (such as Dycem[3]), can be used as an interface between the item and the desk. Simple bookholders[3] can be useful, and many people use creative page-turning techniques such as pushing pages with an eraser through use of a hand-held pencil, head mounted pointer or mouthstick. Some people use these aids to make selections on the keyboard. If holding a pencil/pen is difficult, there are pencil holders available.[3] Desk knobs can be adapted to increase ease of use.

Lighting is also a consideration that can minimize eye-strain and comfort. Adequate lighting over work is needed. Overhead florescent room lighting is often more stressful to eyes than incandescent lighting.

Writing

Independent writing is a primary need for students at all levels, and it can be a major challenge for persons with physical disabilities. For persons who are able to write, but have physical difficulty holding a writing utensil, hand splints/cuffs are available.[3] The computer is also a powerful tool for writing, and is the best solution for many people.

When using the computer as a writing tool, some "low" technology assists can be useful. The keyboard can easily be adjusted to optimize position if is a detachable keyboard model (i.e., attached to the computer via a cable, not part of the main computer package). Angle-adjusting mounting systems for keyboards are commercially-available (Global Computer Supplies[1]).

In some cases, an optimum computer set-up for a person may include a combination of both "low" and "high" technology methods; for instance, a keyboard user with weakness and a limited energy endurance level might use a combination of "voice-entry" and standard keyboarding.

Many people use creative keyboarding techniques such as an eraser end through a hand-held pencil, head-mounted pointer or mouthstick. For persons who type with one finger or these pointing devices (mouthstick, headstick, pencils,etc.) that result in an apparent one-finger approach, there are both software and mechanical solutions available to "latch" keys needed for multiple keystrike commands. Several simple software programs that act to temporarily "latch" keys are available, including "One Finger"[8] and "HandiSHIFT"[4]. Mechanical key latching add-ons are also available.[2,7]

Wrist and hand splints can provide support to improve pointing and keyboarding skills.[3] Raised resting supports for arms and elbows can decrease energy needed for keyboarding[3]. A keyguard[2,3,5,7] can help keyboard-users who experience inadvertent key strike errors, but sometimes adds more visual or physical access complications than assists. Re-definition of the keyboard keys for persons who want frequently used keys in an easier-to-access area is possible through several computer programs, including SuperKey by Borland.

Independence in powering on and off the computer system can be facilitated through the use of surge protector power strips with one power switch; some models provide a cord extension of the power switch for easier mounting.[1]

There are mechanical disk guides[5] for floppy disks (trays to add-on to your disk drives) for physical assistance in inserting disks into disk drives. A hard drive that eliminates frequent use of floppy disk drives is an added expense in a computer system, but can be extremely useful to persons with physical disabilities.

Printer access and easier paper manipulation can be found with the use of tray-feed paper printer models ("inkjet" style), such as the Hewlett Packard Deskjet. Frequent mechanical problems with the standard pin-wheel style paper-feed models can make their use frustrating for persons with and without disabilities; independent printer paper manipulation with the pin-wheel style printers is often impossible by persons with disabilities. In addition, many persons prefer the quality of print of the tray-feed "inkjet" print models.

Telephone

Independent phone access is almost always available to persons with physical disabilities. Speech-impaired persons can use a voice synthesizer with a speaker phone. Speaking persons with physical disabilities are also able to use a speaker phone (Radio Shack[1]) with a simple push-button access. Since speaker phones do not offer privacy in phone conversations, this can be achieved through simultaneous use of a headset or standard handset. Telephone features that can increase ease of use include re-dial and coded telephone directory. Modem usage opens many doors for all persons; modem applications include communication with other offices and individuals, library access, information networks, banking, shopping, and telecommunication systems.

Note-Taking

Many school programs offer a personal or peer assistant to take and share notes with persons who have physical or cognitive disabilities that render them unable to take notes independently. Other solutions that are used include the use of a standard tape-recorder. Since this forces the student to listen to the entire lecture all over again, selective tape-recording is desirable. Under development at Children's Hospital, Boston, is the "Portable Note-Taker" that actually records the student's voice in a private manner through a mouth-piece; the design includes both wheelchair- and body-mounted versions. Laptop models of personal computers can be easily carried on a wheelchair or carrying case, and can be very useful to any persons who are able to type at a faster rate than handwriting.

Page-Turning / Book Manipulation

As discussed in "Workspace Design", above, simple bookholders[3] can be useful, and many people use creative page-turning techniques such as pushing pages with an "eraser" through use of hand-held pencils, a head-mounted pointer or mouthstick. Splints can be used for assistance in holding pencils. Mechanical page-turners are commercially-available, but often are found to be unreliable. One of the most reliable models is the GEWA, made in Sweden and distributed in the U.S. through Zygo[5], Inc. Library access for persons with physical disabilities can be enhanced through layout of books and catalogs on a carousel assembly; demonstration of one design, the AbleOffice, is available on video, (through CRT, Inc.[1]).

Visual Assists

Only a few ideas are included in this presentation for persons with visual disabilities, and these are applications that could be useful for any students. For computer users, positioning of the monitor/screen at eye-level for visual ease can decrease eye and neck strain, and encourage general optimum posture. Frequently needed work items should be within physical and visual reach for persons with physical disabilities. Optimum room and desk lighting over all work can improve visual ease, as discussed in "Workspace Design" above. Anti-glare screen covers[1] are available for computers if room lighting causes glare.

For computer keyboard users who have visual limitations, larger letters can be placed on the keyboard keys; one idea for adding larger letters is use of a plastic cover, or moisture guard, with stick-on letters[6]. Use of software that allows larger screen font, or enlarged print software, can also make reading the computer screen easier.

Eyeglasses for even minor visual correction can be useful, yet may have been sometimes overlooked throughout earlier education years for persons with physical disabilities. Securing eyeglasses against slippage (i.e. slipping "down one's nose") can be accomplished through use of a sportsband or extended earloops.

RESOURCES

1. Many resources are included in the attached list by Susanne H. Shealey for "Compute Desks and Workstation Designs Resources".

2. Don Johnston Developmental Equipment, Inc.
   P.O. Box 639
   1000 N. Rand Rd.
   Bldg. 115
   Wauconda, IL 60084
   tel# (312) 526-2682

3. Fred Sammons, Inc.
   Box 32
   Brookfield, IL 60513-0032
   tel# (800) 323-5547

4. Microsystems Software Inc.
   600 Worcester Road
   Framingham, MA 01701
   tel# (508) 626-8511

5. Prentke Romich Company
   1022 Heyl Road
   Wooster, Ohio 44691
   tel# (216) 262-1984
   or 1-800-642-8255

6. Staples Office Supplies
   P.O. Box 160
   Newton, MA 02195

7. TASH, Inc.
   70 Gibson Dr., Unit 12
   Markham, Ontario
   CANADA L3R 4C2

8. Trace R & D Center
   S-151 Waisman Center
   1500 Highland Avenue
   Madison, WI 53705
   tel# (608) 262-6966

9. Zygo Industries, Inc.
   P.O. Box 1008
   Portland, OR 97207
   1-800-234-6006

COMPUTER DESKS AND WORKSTATION DESIGNS
RESOURCES

Anthro Technology Furniture
3221 NW Yeon Street
Portland, Oregon 97210
(503) 241-7113
(800) 325-3841

Carter and Company
The Barrier-Free Office Designer
10 Livermore Road
Wellesley, Mass. 02181
(617)235-8526

Ergodata Modular Workstations
Business Dimensions, Inc.
475 Washington Street
Wrentham, Mass. 02093
(508) 384-6361
Contact: Paul Campisano
Furniture and design: seating systems with and without armrests and headrest adjustable height Ergodata worksurfaces with modular components.

Computer Bedtable/Workstation
Wheelchair Accessible Workstation
Manufactured by Daedalus Technologies Inc.
Distributed by:
D.J. Technical Sales Ltd.
Unit 5, 12171 Bridgeport Road
Richmond B.C. Canada V6V 1J4

Adaptive Communication Systems, Inc.
354 Hookstown Grade Road
Clinton, PA 15026
800-247-3433

AbleOffice: Workstation System for the Mobility Impaired
CRT, Inc.
CRB Building, Room 311
Georgia Tech
Atlanta, Georgia 30332-0130
(404) 876-8580
Contact: Dr. Thomas Gannaway, Executive Vice President
The AbleOffice system consists of 14 interchangeable components which can be configured to match a user's individual needs for particular job requirements. Nice video of AbleOffice is available through Dr. Gannaway.

Computablility
40,000 Grand River
Suite 109
Nova, Michigan 48050
(313) 477-6720

Craner Cabinetry
3190 South 4140 West
West Valley City, Utah 84120
(801) 966-1127
Contact: Steve Craner
Specializes in custom computer furniture design and manufacturing

Workstations, Inc.
Office Concepts for the Physically Challenged
165 Front Street
Chicopee, Mass 01013
(413) 598-8394
Contact: Deborah S. Kearney, President

Haworth ES™ Wrap-Around Work Surfaces
Haworth Inc.
One Haworth Center
Holland, Michigan 49423

Resources for Industry R.D. #3, Box 12
Walton, New York 13856
(607) 865-7184
Manufacture fully adjustable wheelchair desks and tables

Rifton
Route 213
Rifton, New York 12471
(914) 658-3141

Ergotron Inc.
3450 Yankee Drive, Suite 100
(800) 888-8458
Eastern representative: Carol Wilson
Manufacture computer-based workstations consisting of modular components.

Sources of other components for Workstations

Extensions for Independence
635-5 N. Twin Oaks Valley Road
San Marcos, California 92069
(619) 744-4083

Global Computer Supplies
45 South Service Road, Depot 81
Plainview, New York 11803
(800) 845-8225
Nationwide mail order distributor of computer related accessories including remote controlled surge supporessors, monitor/CPU stands, anti-glare filters, clear keyboard covers and copyholders.

Damark International, Inc.
6707 Shingle Creek Parkway
Minneapolis, MN 55430
(800) 729-9000
Nationwide mail order distributor of various equipment and accessories which can be used in a workstation design.

Placewares
351 Congress Street
Boston, Mass. 02210
(617) 451-2074
Supplier of modular accessories which can be integrated into workstation designs.

Radio Shack
Nationwide distributor of electronics, computers and computer related accessories. Contact your local store for a current catalog.

This resource listings was compiled by:
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Communication Enhancement Center
Fegan Plaza
The Children's Hospital
300 Longwood Avenue
Boston, Mass. 02115
(617) 736-6486

COMPUTER TECHNOLOGY AT NORMANDALE COMMUNITY COLLEGE

Presented by

Tammi Anderson
6591 Manchester Lane
Eden Prairie, MN 55344

TAMI ANDERSON

My name is Tami Anderson, and I am a student at Normandale Community College. I have been attending Normandale for the past two years. I have been a part of the DEEDS Program for the two years I have been here. DEEDS is an acronym for Designing Educational Experience for Disabled Students. When I was a freshman in high school, I was diagnosed with a learning disability. I don't know how long I had it but my freshman year of high school was time to take care of things.

During my four years of high school, I really didn't have that many services; I just had alternative testing. There was not very much technology available to me until I got to Normandale. When I did get to Normandale, I became part of the DEEDS group. I learned about services from Mary Jibben and Karen Hanson and other DEEDS and Independent Learning Center staff.

The kind of technology that I do use is the Apple IIE computer and they are available to me whenever I need them being that I am part of the DEEDS group. I had to go through about one hour or so of a training program. I sat down with somebody who was familiar with Appleworks Program and this person trained me so that I could be familiar and comfortable working with the program. I was taught how to put the disks in, how to take them out, how to get into options, how to double space, single space, etc.; I just learned all the steps that go into working on the Appple IIE computer.

I decided to use this technology because, being that I have known my learning disability for four years now, I know what it takes and I know what I need to do to get the education that I need and the education I [redacted] Sitting down at a typewriter isn't quite what I ne[redacted]; I need the [redacted]ogy, and I need to be able to have some equipment whe[redacted]e it can be easily accessed and I can easily have the help of someone working in the Independent Learning Center. People are always there if I need the help. If I am at home, people are not always around to answer my questions or to help me proofread things or look over the paper that I am working on.

I have been using the technology for two years, as I have said. I am completing my two years after Fall quarter 1990. I found out about word processing from Mary Jibben, who then introduced me to Karen Hanson. Karen and Mary have worked with me for two years that I have been here. For everybody who is learning disabled and is struggling and does need help, I would recommend them to come and talk to Karen or Mary about this technology or to come to Normandale's Independent Learning Center. It is a fabulous area here - lots of help and lots of people willing to help. There are too many people out there who have learning disabilities and don't speak up for themselves and don't get the help. Then they struggle and they don't get the education that they want and that they are striving for.

I would like to provide some examples of what this technology has allowed me to do and how it has made it easier for me. As I have said, it has made my struggles that I had in high school not such a struggle. It was always one constant battle over another, always one frustration after another: reading papers, writing papers, proofreading papers, having papers neatly written. I don't have a writing problem, but just having papers neatly typed out on paper had been much more helpful to me. It has also been very nice to be able to come in and sit down at the computer whenever I need it and to have help, to work on the system Apple IIE.

The computers that are for priority use have been purchased through the Normandale Foundation DEEDS account. Primary donations to this fund have been through the Bloomington Rotary's yearly fundraiser that supports Courage Center and Normandale's DEEDS program and the Kaiser Roll which supports among others American Lung Association, Courage Center, and Normandale's DEEDS program. Much of the credit for this financial assistance must be given to Dr. Daniel Barnett, Dean of Institutional Services, who is active in these two organizations and gained support for Normandale.

As far as I know, there aren't really any problems maintaining this equipment. It is always there for me when I need it. The disks are always available, the hours that the Independent Learning Center is open with staff are Monday through Thursday from 8 a.m. to 9 p.m. and Fridays from 8 a.m. until 4 p.m. If the Learning Resources Center is open (Friday evenings and Saturday), Appleworks and the computers are available for individual use.

Having used the technology at Normandale Community College, I would recommend for first time users to come in and go through the one-hour training class and get familiar with the Apple IIE and Appleworks and then use it whenever they do need it. It is always available here for DEEDS students and for other students who are not DEEDS students. However, the DEEDS students, as I have said before, have first priority to the computers in the ILC; there are computers upstairs for other students to use.

If anyone is hesitant to use this, I strongly encourage people to come in because it has helped me get A's and B's on papers that I have worked on; it has helped me in my MATH 105 class, which is an elementary education class. We had computer work that needed to be done on the computer from class and being that I could just come in as a DEEDS student, sit right down, get the help that I needed by having someone there to help answer my questions and work with me on the computer was something that I don't think I could get at any other institution. I could probably get it, but it would not be as helpful as the help here and the technology that I have had available to me here at Normandale Community College.

The technology that has been available to me here at Normandale has been fabulous, and I recommend it to anyone who does need it; I encourage them to take advantage of it.

"RESOURCE TECHNOLOGY"

Presented by

Scott Dehn
Southwest State University

RESOURCE TECHNOLOGY

By Scott Dehn

I. Background

A. Hometown -- Deerwood, MN
B. Senior at Southwest State University
C. Management Information Systems Major
D. Disability
   1. Cerebal Palsey
   2. As it relates to education -- Dexterity and Mobility
      a. Difficulty in typing, writing, etc.
      b. Moving from one class to another in allotted time

II. Technology

A. Resource Technology
   Definition: Use of common technology and human resources and adapt them them to specific case.
B. Past programs
   1. High School and Brainerd Community College
      a. No set procedures
      b. Mostly trial and error
      c. At Brainerd Community College more of a routine, but no one to oversee it
   2. Southwest State University
      a. Set procedures
      b. Needs assessment necessary to adapt to case
C. Current Program
   1. Academic area
      a. Portable electronic typewriter for most work
      b. Computer with spreadsheet program for math and quantitative courses
      c. Test proctoring through Learning Resources
      d. Note-taker in class
   2. Other areas
      a. Personal care attendant
      b. Power wheelchair
      c. Tray carrier in food service
      d. Adapted P.E. for credit

III. Philosophy of use of technology

A. In most cases, good idea
B. Dangers
   1. Sometimes we think that people with similar disabilities can use the same technology
   2. If this is not possible, it adds to disability
C. Therefore, it is crucial to do a needs assessment for each individual case

"COMPUTER WORD PROCESSING AND THE SPEECH SYNTHESIZER"

Presented by

Richard Frederick
Instructor - Word Processing
Minneapolis Community College

Computer Word Processing
And the Speech Synthesizer

Prior to 1979, I was a commercial artist with my own business. In 1979, at the age of 36, I began losing my vision due to my diabetes. For the next four years I went through several eye operations and numerous laser treatments. By 1986, I was left with a slight degree of light perception.

In 1984, I began attending the Minneapolis Society for the Blind. It was there that I was first introduced to an Apple computer. I chose the Apple because of the ease of the keyboard. The spacing between keys seemed more congruent with the typewriter I had been using. Also, there were fewer keys to learn. At the time, I was not thinking of computers in job related terms; rather, the computer, coupled with an audible software program, allowed me to pursue my creative writing.

I chose the BEX word processing application program and the Echo voice synthesizer for several reason. First, and foremost is the cost. A price of $530.00 for both seems extremely reasonable to me, especially considering the IBM Vert is around $2,200.00. Second, the BEX program offers a great deal of versatility. Besides working with ink and braille printers, it also works with O.C.R.'s, converts text from other programs, gathers information from remote keyboard, and provides talking and large screen capabilities. Third, with the BEX, there is no need to assume certain things are happening such as with some adapted audible programs. Last, the BEX and Echo are portable. They are not tied to one specific computer.

In 1985, I enrolled at Minneapolis Community College. State Services for the Blind leased me an Apple Computer, printer, etc., and purchased the BEX program for my use. I have been using it ever since. My computer knowledge has allowed me to win creative writing awards, have fictional stories published, be managing editor of the City College News, teach computer word processing to learning disabled students at MCC, and start a BEX course this past winter quarter, also at MCC.

I would imagine the biggest drawback to the BEX is the voice. The phrase "You get what you pay for" is true in this case. It does take some getting used to. Another factor is that the program is unlike any other program I have ever used. There are many unusual commands to be learned. On the other hand, once learned, it makes it easy for the blind user to know what is happening with his/her text.

Computer technology can expand his/her potential. It may keep a disability from becoming a handicap. I strongly urge anyone interested in computers to visit different suppliers, or talk to some one who uses them.

"THE ACHIEVEMENT OF A DREAM"

Presented by

Bennit L. Pittsley
Volunteer and Advisory Board Member
Normandale Community College

The Achievement of a Dream

Would you believe that when my wife and I were injured in an automobile accident and lost our business it was the beginning of the achievement of our dreams?

As a young man, I wanted to work with the handicapped and teach them what I had learned about surviving in a world where the odds are against the physically challenged. I wanted to inspire them to persevere against those odds.

My wife had always wanted to go to college. Beside her injuries, she has a chronic condition, which affects the sense of balance, called Meniere's Syndrome.

In 1984, because of the accident, my wife was sent to Normandale Community College to train for a new career. I drove her to school and passed my time in the library while she was in class. One day a student--who had forgotten to sign up for help in the learning center--was very upset because he couldn't take a test. I asked a staff member if I could volunteer my services since I would be there for two or three years while my wife earned her degree. Two days later, Karen Hanson, the department head, asked me to answer the phone and direct people to the right areas of help.

As time passed, I assisted in the testing area, reading and writing for the handicapped. Mary Jibben, who is wonderful at helping students find solutions to problems, asked if I'd like to learn some Apple Computer programs. I was interested in computers and felt it would be a great asset. There was only one computer. I had a lot of free time to devote to the Applewriter program and learned quickly with Mary's help. Later that quarter, Mary asked if I felt confident encough to help some handicapped students learn computer. We started with six students.

The next quarter Mary and I simplified the Applewriter instructions which made it easier to learn. As the handicapped students observed the freedom the computer allowed in creating the written material for classes, the demand for help and computer time increased. Mary Jibben asked Phi Theta Kappa to expand their assistance to include computer help and we requested five new Apple IIes.

I learned of special devices developed by Courage Center to help those with limited arm usage and we ordered them. We soon added enhancers for those with visual impairment so those students could work with little or no help.

Normandale sent me to a seminar to learn how to install special computer cards and what is available for the handicapped. I was asked to simplify the Appleworks manual the way Applewriter had been done. Through working with the programs and going to seminars I developed understanding of how computers are constructed and skill with the programs so I was able to service the computers and correct the student's errors. I taught a one-hour class each quarter to the students in the study skills program.

The Achievement of a Dream

The Independent Learning Center didn't just work with the disabled, but any students who needed special help. A coupon was issued in the student booklet for one hour of free computer training on the Apple IIe Computer. Seven thousand students were given the booklet. I was thankful only 700 of them took advantage.

I was overjoyed with the effect the ILC had on the lives of those we worked with. One student--who was trying to educate herself toward employment after a brain injury--had difficulty with the instructional terms. We worked out terms she understood. At the end of the quarter, she came into the ILC crying and laughing at the same time because she received an A on a final paper. I will always remember the hug she gave me and her great joy at her accomplishment. There were students who had to hold a pencil in their mouth to write rough drafts and then hire someone to type their papers. They were freed by learning to do the whole project by themselves on the computer using special attachments. Many of those handicapped students graduated and I felt rewarded when they told me they had developed the courage to go on to higher education than they had originally not planned.

As students learned from me they helped each other and fortified what they had learned. The ILC is an area of help, support, understanding, and love.

Every school in this state--no--every school in this nation should have computers and adaptive equipment so students with disabilities can enjoy the freedom others take for granted! Normandale Community College is a forerunner in its development of a system which provides opportunities for success to those who are physically challenged. Karen Hanson, Mary Jibben and the staff in the ILC hold out a hand of hope to anyone who is having a problem getting and education. They helped my wife to overcome the many challenges she faced. She achieved her dream and graduated with high honors. We both now work in the Community Education System in Elk River.

I often think of how my fulfillment of my dream began. Karen and Mary didn't ask me for special credentials in order to serve. They took my willing hands and put them to use, my willing mind and trained it to do all it could do, and my willing heart and filled it with such joy that I will be eternally grateful.

If we could just instill in the minds of all students--from kindergarten through college--that schools of all kinds are there for them to realize their dreams, we would not have educational drop-outs. Society would benefit because education is the key to freedom from poverty. When students are challenged with physical or mental problems, we need to insure them they do not have to give up. Everyone has the right to realize their dreams. I'm thankful I was able to achieve mine.

STATE SERVICE PANEL PRESENTATION

Presented by

Rachel Wobschall, Executive Director
STAR Program
300 Centennial Building
658 Cedar Street
St. Paul, MN 55155

Adaptive Technology as it Relates to Post-Secondary Education
Michael Dugan

"Telecommunications Access for Communication Impaired Persons"
William Lamson

Transition Services
Roger Strand

Vocational Rehabilitation Services Tailored
to the Needs of the Individual
Paul M. Bridges

STATE SERVICE PANEL PRESENTATION
BEYOND RAMPS: ACCESSING HIGHER EDUCATION
THROUGH TECHNOLOGY CONFERENCE

Radisson Hotel, South Bloomington, MN
April 19, 1990
Rachel Wobschall, Executive Director, STAR Program

The Minnesota STAR Program, A System of Technology To Achieve Results, is a project of the Governor's Advisory Council on Technology for People with Disabilities. Funded by a Grant under P.L. 100-407, the program will develop and implement a comprehensive consumer-responsive statewide system of Technology-Related assistance for individuals with disabilities of all ages.

STAR offers assistance, training, and programs in Public Education, Public Policy Funding, Advocacy and Delivery of Assistive Technology Devices and Assistive Technology Services.

Specific programs and services offered by STAR include:

1. Funding and technical assistance for Accessing Higher Education Through Technology.

2. The Assistive Technology Information Network. Residents of Minnesota and Iowa can access information about Assistive Technology Devices via a toll free number 1-800-331-3027. The network can answer questions about;

   - o What Assistive Devices are available to meet specific needs.
   - o The companies that manufacture specific devices.
   - o Detailed descriptions of devices and information on prices.
   - o Suggestions on how to order specific devices.

3. A series of Public Education Brochures that cut across all areas of disability and technology.

4. Offer intensive training to professionals to develop a local expertise on the field of assistive technology.

5. Sponsor an internship program to develop expertise in graduate students about public policy and technology for people with disabilities.

6. Training for individuals, families, and professionals on "how to" access Medicaid (Medical Assistance) funds for technology devices and services.

7. Training for Individuals and families on issues of empowerment and technology related assistance.

8. A grant program to fund community-based technology-related resources.

9. A grant program to fund a mobile delivery system for rehabilitation technology devices and services.

10. A Research and Development Forum to highlight new assistive and restorative technologies.

11. Governor's Awards Program to recognize Minnesotans who have developed assistive devices for individuals with disabilities.

For more information on these activities, please contact:

The STAR Program
(612) 296-2771 or (612) 296-9962
300 Centennial Building
658 Cedar Street
St. Paul, MN 55155

ADAPTIVE TECHNOLOGY AS IT RELATES TO POST-SECONDARY EDUCATION

Presented By

Michael Dugan
Adaptive Technology Specialist
Minnesota State Services for the Blind

PRESENTATION

MINNESOTA COMMUNITY COLLEGE SYSTEM

April 19, 1990

Good morning. I am happy to have this opportunity to speak to you this morning on the subject of adaptive technology as it relates to post-secondary education and the services provided by Minnesota State Services for the Blind and Visually Handicapped (SSB) in this important area.

First of all, let me give my standard warning message. That is that technology is not magic, and is not for everyone, or for every task. Unfortunately, we are bombarded with dazzling images of technology and its so-called "magic". If you doubt this, I need only point you back to the infamous Stevie Wonder ads for a certain talking reading machine that people from the company even admit was a gross disservice to the blind community. As disabled people, we need to respect the capabilities of technology, while never forgetting what got us there; namely the ability to communicate by the oral and written word using tools less sophisticated and less costly than computers.

Now, to the flip side of this issue! In the past several years trends have merged that are making things a lot easier for the blind and visually handicapped post-secondary student. In fact, I have often told groups that I have spoken to how nice it would have been to have some of the devices that are now available when I was in college. I feel like the Father who tells his son how he walked nine miles to school in the snow with rags tied to his feet, and I'm not that far from college. At any rate, three trends are to put more power into smaller packages, design products that are more compatible with equipment being used in the working mainstream and healthy competition between manufacturers to produce better and less expensive products. The latter is particularly crucial in the blindness field where many modifications run into the thousands of dollars.

Examples of more portable technology can be seen everywhere. Hand scanning cameras for closed circuit television reading systems that allow the user to read in two places or connect to a regular TV set, a portable Braille embosser that is half the cost of most others on the market, briefcase size note-takers that hold at least forty pages of information and, of course, lap-top computers that are as powerful as the desk-top computers of just three years ago. The added flexibility of these products i.e. ability to connect to PC compatible computers, and their flexibility to do double and triple duty make them far more useful both for a student and later on in the work place. For instance, a portable note-taker can double as an external speech synthesizer for a PC and a serial communication device for uploading and downloading information. And all for about one thousand dollars!

Even optical scanners, long a pipe dream of the individual user, are now available at three to four thousand dollars. They require knowledge of a PC, and they are not a replacement for live readers; since they will meet approximately half of a typical user's needs.

Let me turn to a very brief overview of access to our services. As many of you are aware, the rehabilitation process begins with an application. The applicant is then assigned to a Rehabilitation Counselor, and information is gathered to determine eligibility for services. Once eligibility has been established, client and counselor sit down and formulate an Individualized Written Rehabilitation Plan that may include any of the services the agency offers or purchases from outside agencies. One of the services we offer is orientation to adaptive equipment. This is given to clients for whom technology has been identified as an element in an IWRP. The technology may be geared toward meeting the needs of a student with an eye to eventual job placement. The particular adaptive equipment that is recommended is totally dependent upon the needs of the individual and the demands of the work or school site. Our job (that is, Jerry Wood and myself) is to assess the needs and make the recommendations regarding adaptive equipment as well as generic technology. Once the recommendation has been implemented, we would assume responsibility for providing training in the use of adaptive equipment

One critical need that has arisen, however, relative to the provision of technology to clients is that of general computer training, particularly in popular commercial software such as WordPerfect, Lotus 123 and dBASE. Though we have recognized the fact that it takes specialists such as myself and Jerry to provide orientation and training with specific equipment or the blind user, it is far more appropriate we feel that Community Colleges and other institutions in the mainstream provide the more generic types of computer training. This is also the message that we have heard loud and clear from consumers.

We want to work with the system of post-secondary education in Minnesota to facilitate the most effective transition of blind and visually handicapped students from school to work. To do this, we need to look at equipment that is actually being used in the real world. This does not necessarily mean an IBM compatible computer for everyone, but it certainly does mean equipment that has the flexibility mentioned earlier. If it does not, it will be increasingly difficult to compete in a continually changing environment.

Finally, let me say a few words about funding and the SSB Technology Resource Center. Currently, the agency is looking at expanding its capabilities to work with clients, consumers and others working in the field relative to assistive devices. We are exploring various alternatives for funding including community organizations such as the Lions and grants from the private sector. The center is under development, and we expect it to grow along with the need. In the long term, we hope to develop a "loan pool" of equipment to alleviate the

problem of unavailability of equipment at the point of need. These are lofty goals, and we may not reach them tomorrow. We would hope, however, that working in "partnership" (to use a word that is probably overused these days), as we have already done with Community Colleges in Duluth, Grand Rapids, and Minneapolis, we can at least continue the progress.

Thank you again for the opportunity to speak here this morning. Please feel free to call me if you have questions about assistive technology and its application to the blind and visually handicapped.

Michael Dugan
Adaptive Technology Specialist

"TELECOMMUNICATIONS ACCESS FOR COMMUNICATION IMPAIRED PERSONS:
THE MINNESOTA EQUIPMENT DISTRIBUTION PROGRAM"

Presented by

William Lamson
Coordinator, Equipment Distribution Program
Minnesota Department of Human Services, Deaf Services Division

Presentation by William Lamson,
Department of Human Services
"TELECOMMUNICATIONS ACCESS FOR COMMUNICATION IMPAIRED PERSONS
THE MINNESOTA EQUIPMENT DISTRIBUTION PROGRAM"

PURPOSE OF PROGRAM

The purpose of the Equipment Distribution Program is to help make telephone services for communication impaired people as accessible and valuable as they are for people without communication impairments through the distribution of specialized communication devices to eligible households with communication impaired members.

TACIP

In May of 1987, Governor Rudolph G. Perpich signed the Telecommunications Access for Communication Impaired Persons (TACIP) bill into law. This legislation created the TACIP Board as a state agency with the responsibility of improving access to telephone communications services for Minnesota residents with communication impairments.

MISSION

The mission of TACIP Board is to direct two major projects to promote increased access to the telephone network for communication impaired people. The message relay service was established to facilitate telephone communication between communication impaired people who rely on Telecommunication Devices for the Deaf (TDD) and non-communication impaired people who do not have TDDs. The equipment distribution program distributes specialized telecommunications devices and other equipment to eligible households to increase access to the telephone system.

The 1987 TACIP Act requires the Board to contract with a community organization to provide the message relay service. An amendment to the original TACIP law passed in 1988 requires the TACIP Board to contract with the Minnesota Department of Human Services for the distribution of equipment.

BOARD COMPOSITION

The board consists of 12 members to include:

1. the Commissioner of the Dept. of Human Services or designee;
2. the Commissioner of the Dept. of Public Service or designee;
3. five communication impaired persons appointed by the Governor;
4. one person appointed by the Governor who is a professional in the area of communications disabilities;
5. one person appointed by the Governor to represent the telephone company providing local exchange service to the largest number of persons;

6. one member of the Minnesota Telephone Association appointed by the Governor to represent other affected telephone companies;
7. one person appointed by the Governor to represent companies providing inter-LATA exchange telephone service;
8. one person appointed by the Governor to represent the organization operating the message relay service.

BOARD STAFF

The TACIP Act permits the Board to establish a position of program administrator to manage the Board's affairs and to monitor the message relay service and the equipment distribution programs.

FUNDING

The TACIP Act requires every telephone company providing local service in Minnesota to collect a surcharge of 10 cents per local access telephone line per month and transmit it to the TACIP Board via the Commissioner of Administration. This funding supports both the message relay service and the equipment distribution program.

APPLICATION PROCESS

The application process involves the completion of the EDP Application Form by the recipient and a formal interview to determine eligibility for services. The applicant must provide adequate documentation of income, residence, phone service, and, communication impairment. Applicants denied for service are given information on other resources where they can buy or lease the equipment they need.

RECIPIENT TRAINING

Applicants approved for services are evaluated for their telecommunication needs and then given extensive training on the installation and operation of the equipment.

PROGRAM STATISTICS

The Equipment Distribution Program to date has distributed 3,447 devices to 2,262 households throughout the state. Also, 827 inservice presentations have been given with 16,240 people in attendance. Inservice presentations consist of a general overview of TACIP, and the Message Relay Service. Detailed information is presented on the EDP application process, eligibility criteria and equipment available.

AVAILABLE EQUIPMENT

It is the objective of EDP to provide equipment that most accommodates the individual needs of the recipients. Accordingly, the EDP has a wide variety of equipment available. EDP distributes telephone amplifiers, telephone ring signalers, Telecommunication Devices for the Deaf (TDD), TDDs with large visual displays, and telebraille equipment. Other types of adaptive equipment such as hands free telephones, keyboard guides, etc. may be provided to qualified communication impaired people who also have a physical disability.

"TRANSITION SERVICES"

Presented by

Roger Strand
Chair/Planner
State Transition Interagency Committee/Governor's Planning Council
on Developmental Disabilities in the State Planning Agency

Transition Services

INTRODUCTION: Roger Strand is the Chair of the State Transition Interagency Committee and is a Planner of the Governor's Planning Council on Developmental Disabilities in the State Planning Agency.

Background Information: The need to address the many concerns regarding what happens to students with disabilities after they leave secondary education and the need to coordinate services being offered by several agencies was realized as early as 1982 in Minnesota. In response to a federal initiative, three Minnesota state agencies (Special Education, Vocational Education, and Vocational Rehabilitation) began dialogue and developed a first state level interagency cooperative agreement relating to transition services. This agreement addressed how the participating agencies could coordinate their activities and resources. It also gave direction for streamlining shared reasonabilities and for improving services for persons with disabilities and their families. This idea has grown, and as you will see, Minnesota has emerged as national leaders in making available quality services and programs for youth with disabilities as they move from school programs to adulthood.

Definition of Transition: The term "transition" refers to the process that persons with disabilities experience as they progress from secondary education to post-secondary training and/or to working and living in the community. Focus of transition services includes those individuals with disabilities who are currently attending education programs as well as those who have already left school, many of whom were not provided with adequate transition planning and services in the past.

Currently, between 5,000 and 6,000 students with disabilities leave secondary education programs each year.

For the purpose of our discussion today, I would like to emphasize that this definition includes students in higher education, as well, for there is a need to provide assistance to them as they graduate and enter careers, get married, have families of their own, and participate in everyday living in their communities.

Statewide planning efforts have revolved around three central and interrelated goals: (1) interagency planning for individual students and their families; (2) interagency planning to coordinate transition services within each community; and (3) intra- and interagency planning at the state agency level.

Interagency Planning for Individual Students: In 1986, the State Legislature passed requirements which ensured that the transition needs of youth with disabilities would be fully addressed in students' individual education plans beginning at grade nine or age 14.

Transition Services

Interagency Planning Within Each Community: The 1986 State Legislature also passed a statute requiring local districts to establish Community transition Interagency Committees. These committees must at a minimum include representatives from the following agencies:

- special education;
- vocational education;
- regular education;
- community education;
- post-secondary education and training;
- parents of youth with disabilities;
- local business or industry;
- rehabilitation services;
- county social services;
- health agencies; and
- adult service providers.

Currently, more than 80 Community Transition Interagency Committees have been established and are at various phases of development. Collectively, according to a recent report by the Department of Education, members of these Committees identified the following priorities for receiving technical assistance:

1. Implementation of the follow-up system that was developed by the Institute on Community Integration at the University of Minnesota;

2. Provision of training for school and agency staff on the transition process;

3. Development of functional curriculum in secondary special education programs; and

4. Provision of training to parents.

Intra- and Interagency Planning at the State Agency Level: There are three major functions at the state level: (1) the Interagency Office on Transition Services; (2) the State Transition Interagency Committee; and (3) several projects funded by the Department of Education located at the Institute on Community Integration at the University of Minnesota.

The Interagency Office on Transition Services was established by the 1985 State Legislature, and is located in the Unique Learner Needs Section of the Department of Education. Stephanie Corbey serves as the Transition Specialist, and is central to coordinating the may activities at the state level, as well as providing technical assistance to local committees and school districts. Recent activities include:

- o Providing intensive training through Project Invest to 30 professionals to, in turn, provide training and technical assistance to others in all regions of Minnesota.

- o Developing a statewide follow-up system as mentioned above. This follow-up system is designed to obtain information on the post-school outcomes of former special education students.

The State Transition Interagency Committee (STIC), mentioned earlier, was expanded in 1985 to include representatives of additional agencies and interests such as parents, developmental disabilities, community colleges, human services, community education, and supported employment. In July 1987, the "Minnesota Interagency Cooperative Agreement to Plan" was signed by the major participating agencies, later appearing as an official publication in December 1987.

The mission of the State Transition Interagency Committee is to ensure that state and local agencies work together to develop a system of services so that all Minnesotans with disabilities have the opportunity to live and work within their communities as independently as possible.

The Institute on Community Integration at the University of Minnesota has initiated a number of projects through federal inservice grants and student follow-up studies to support the direction undertaken in the state. The Institute on Community Integration is assisting the Department of Education through a discretionary grant project to provide technical assistance to Community Transition Interagency Committees. Currently, Sandy Thompson, Project Coordinator, provides this assistance and has recently compiled a report to the State Legislature on the status of the Community Transition Interagency Committees.

The Institute at the University and the Department of Education have also recently published a guide for the local committees, entitled, Interagency Planning for Transition in Minnesota: A resource Guide, 1990.

Issues Relating to the Promotion of Technology: Several issues emerge relating to the transition of students with disabilities and the use of technology:

1. Interagency coordination: Certainly the advancement of technological resources in Minnesota for students with disabilities has interagency ramifications. The networks already established regarding transition services can be utilized to create and orchestrate some of the following:

   - o Regional technological resource centers which provide evaluations, assessments, adaptations, research and development, and training for students, parents, and faculty;

- o Opportunities for low-interest loans to purchase materials and equipment; and

- o Linkages with business and industry, not only for their technological expertise, but for employment opportunities.

2. Transfer of student records to post-secondary education programs: Acquisition of student records and information has been documented as a problem by many higher education agencies. A subcommittee of the State Transition Interagency committee is currently discussing the need to mandate that student records, including assessments and evaluations, be provided to students as they leave secondary schools (similar to "separation papers"). This will probably have to be legislated. Such information could include the use of adaptive aids and equipment, as well as the skills acquired in the use of communication aids.

3. Prerequisite skills: In time, students with disabilities who use technological aids, such as word processors, should be expected to know how to use certain assistive programs, such as "spell check," etc. Perhaps summer programs, or preliminary courses, can be offered along with other precollege entrance courses in order to prepare students, provide additional evaluations and assessments, and make any special adaptations--for the purpose of giving them the competitive edge needed? These and other issues must be articulated to the secondary school system, such as through the local committees.

I could add to the list of concerns; availability of technology and expertise in rural areas; costs, follow-up assistance to employers in making reasonable accommodations; etc. However, I would leave you with my major concern, which transcends the use of technology--the need for personal support networks. A young adult who leaves the public schools system is often also leaving behind an established social support network. In order to launch young adults with disabilities and meet their needs in the community, social support is critical. The theme of this conference, "Beyond Ramps" has to include fostering of friendships. It is the key to bridging the gap between community presence and true community participation.

VOCATIONAL REHABILITATION:
SERVICES TAILORED TO THE NEEDS OF THE INDIVIDUAL

Presented By

Paul M. Bridges
Area Management Specialist
Minnesota Division of Rehabilitation Services

Vocational Rehabilitation: Services Tailored to the Needs of the Individual

Paul M. Bridges
Area Management Specialist
Minnesota Division of Rehabilitation Services

The Minnesota Division of Rehabilitation Services is a multi-program unit of the Minnesota Department of Jobs and Training. The Division is funded by a combination of Federal Rehabilitation Services Administration allocations and state of Minnesota money. The Mission of the Organization is:

> To provide services to enable persons with disabilities to increase significantly their vocational, personal, and financial independence, with special attention to those with the more severe handicaps and handicapping conditions.

This Mission is accomplished through an organizational structure combining direct individual client services, grant monies, contracts, and support activities. The five Sections of the Division are:

Vocational Rehabilitation
Consumer Relations
Client Support Services
Rehabilitation Resources
Disability Determination

For the purposes of this brief presentation, attention will be focused on the client services component of the Vocational Rehabilitation Section. This activity, commonly referred to as the "basic" program, provides a wide array of vocational rehabilitation services to thousands of qualified individuals with disabilities throughout the State. These services are delivered by a staff of approximately 150 Rehabilitation Counselors working out of 35 "Field Offices" geographically distributed throughout Minnesota. The funding mix for this program is roughly 80% Federal and 20% State. Approximately $10 million annually goes to financing individual rehabilitation plans for eligible clients.

Access to this program is contingent upon meeting the established eligibility criteria as opposed to being available to the general population on an entitlement basis. To be eligible for Vocational Rehabilitation a person must have:

- a disability
- which for that person results in a substantial vocational handicap, and
- there is a reasonable expectation that Vocational Rehabilitation services will benefit the person in terms of employability

The Vocational Rehabilitation "process" is a time-limited continuum of activities that, when successful, results in the person with the disability being employed in (or maintaining) a position commensurate with his/her skills and abilities. The "process" is:

- referral
- eligibility decision
- Individual Written Rehabilitation Plan development
- plan delivery
- closure
- post employment activities (as needed)

In preparing for the eligibility decision, the Rehabilitation Counselor does a comprehensive diagnostic study, analyzing such factors as the client's medical, educational, financial, social, and vocational status. Special attention is given to the barriers confronting individuals as they attempt to prepare for, obtain or maintain employment.

Based on this study, the eligible client and the Counselor develop the plan of services that will address the identified problem areas. Services are tailored to that particular client. Although the specific services any one client receives willvary, "typical" services might include:

- information and referral
- vocational evaluation
- skill training
- transportation
- rehabilitation technology
- placement
- follow up

In the category of skill training, Vocational Rehabilitation frequently assists its' clients with services enabling participation in post-secondary academic settings. Help with tuition, books and supplies, and room and board are quite common. Additionally, both "low" and "high" technology interventions are possible.

These might include:

- tape recorders
- notetakers
- interpreters
- communication devices
- mobility aides
- computers

Again, the type, degree, or amount of assistance any one individual might receive is totally dependent upon their particular situation and presenting problems.

To help a student from your educational setting explore what services might be available through the Vocational Rehabilitation Program, simply contact your nearest Division of Rehabilitation Services Office.

"PLANNING ADAPTIVE COMPUTING SERVICES IN POST-SECONDARY EDUCATION: AN INTEGRATED APPROACH"

Presented by

Darola G. Hockley
Coordinator-Adaptive Computing Technology Center
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PLANNING ADAPTIVE COMPUTING SERVICES IN POST SECONDARY EDUCATION: AN INTEGRATED APPROACH

Institutions of post-secondary education are increasingly challenged to provide adaptive computing services for persons with disabilities. The integration of computer technology into all areas of academic and administrative activities necessitates student, faculty, and staff development of computing skills. As computing becomes a societal norm, people entering the work force with computing skills will have a competitive edge. However, students, faculty, and staff with severe disabilities can not use standard computer systems. Thus, for people with disabilities, the integration of computing creates educational and employment barriers. Adaptive computer services assists people with disabilities to overcome these barriers.

Once the need for adaptive computing services is recognized, a strategic plan for providing services can be developed. The first step of planning involves examination of campus computing activities and general campus accessibility. This step identifies the scope of adaptive access needs.

General campus accommodations for people with disabilities indicate the level of campus awareness and commitment to accessibility. Heightened awareness and campus dedication to access provides a more responsive climate for development of adaptive computing services. More responsive campus environments require less time and energy to be spent on increasing awareness of both general access issues and adaptive computing needs.

The number of people with disabilities on campus provides a baseline for estimating the quantity of adaptive systems needed. The distribution of disability types indicates where initial efforts should be focused. Consumer input from individuals with disabilities can assist in guiding development plans. However, the awareness of computing activities and/or adaptive technology may need to be raised before people with disabilities can provide a substantial amount of guidance. When development is consumer driven, initial efforts may be biased towards the needs of the majority. Development plans need to include all types of disabilities.

The magnitude of general computing activities indicates the scope of needed services. For campuses to maintain non-discriminatory status, people with disabilities must be provided with computing opportunities comparable to general computing activities. General computing services are evolving to provide the general population with user services (lab access, training, and documentation), field service and repair, and systems consultation. Many of these services are in an early stage of planning thus adaptive computing services can be integrated into their development.

Examination of the access environment and computing activities typically indicates a need for adaptive computing access in general facilities and services, academic disciplines, and general academic endeavors. General facilities and services includes areas such as computerized library offerings, general access computing labs, academic skills development centers, and electronic registration. Strategic planning for access in this area typically develops multipurpose adaptive systems around existing hardware/software systems.

Academic discipline are increasingly integrating computing activities into the curriculum. Discipline specific computing activities cover a wide range of activities from word processing to computer aided design. Many departments have specialized labs. Planning adaptive access in this area usually involves development of multipurpose adaptive systems based on existing systems. However, certain disciples use specialized systems that can not be modified, and thus highly individualized solutions may be required.

Planning for adaptive computing in general academic activities involves using the computer as a compensatory tool. Traditionally this area provides lap-top computers for note taking and adaptive systems for taking tests. Current planning incorporates highly individualized systems which allow students to perform all class assignments on the computer, and systems which encourage active participation in class discussions and presentations.

The second step in planning adaptive computing is determining what specific services are needed. Adaptive system access, training and support, consultation, and some degree of research is required.

Initial efforts should provide adaptive systems in a centrally located accessible site. Training and support is necessary on-site to ensure the equipment is fully and properly used. Consultation with individuals and departments is needed to identify and implement appropriate adaptive solutions. Research is needed to identify adaptive systems that are compatible with current and future computing activities.

The final step in planning adaptive services is determining what area on campus is responsible for providing which services. Ideally, the campus as a whole will commit to developing adaptive services. Disabled Student Services will work together to provide direct services and support.

Following these steps the University of Missouri-Columbia established the Adaptive Computing Technology (ACT) Center. The Center's mission is to implement adaptive computing in a manner which enhances integration of people with disabilities into the higher education environment. To accomplish this mission adaptive computing support and services are being integrated into general computing facilities and services.

The ACT Center has four primary goals. The first goal is to increase access to the academic environment. This goal is accomplished by providing Macintosh and IBM adaptive systems access in the Art and Science 100 station general access lab. Checkout services are to be provided for widespread campus access to adaptive systems.

The second goal is to provide adaptive systems training and support. Training and high level support services are based in the Arts and Science and are provided to three primary groups:

a) People with disabilities on how to use adaptive systems;

b) Students in disciplines that work with disabled people including Education, Allied Health, Engineering, etc.;

c) Service providers including computing personnel, rehabilitation professionals, and allied health professionals.

Computing lab personnel for all 19 lab sites will receive basic adaptive systems and sensitivity training to provide adaptive system support campus wide.

The third goal is to provide consultation services. This goal is reached by providing system recommendations, conducting awareness sessions, and disseminating information. People with disabilities are provided with individualized system recommendations. Faculty are assisted with implementing accessible computer-related course assignments, integrating adaptive computing skills in the "how to use" computer courses, and including the field of adaptive technology in the course content of related disciplines. Departments and support services are assisted with identifying adaptive systems which allow full participation by people with disabilities. Awareness session are conducted for the entire campus and for local and state service providers. Additionally, information is disseminated on request electronically, by phone, by mail, and through conference presentations.

The center's final goal is to establish a research emphasis. This emphasis includes identifying, evaluating, and developing adaptive computing systems, identifying and implementing computing systems that compensate and overcome educational barriers, and identifying barriers that are created by technology to ensure that access is not decreased by the implementation of computers.

During the first year, the center has provided direct training and systems support to approximately 60 people with disabilities. These consumers include people who have mobility impairments, visual impairments, blindness, or learning disabilities.

From the start of winter semester 89', the ACT Center has received requests from 58 students, faculty, or staff with disabilities for training support. Currently the center is training or providing support to 31 individuals; 27 students and 4 staff members.

The center is established under Campus Computing within Computing Services. Computing Services provides the center's major support. An holistic approach is used to develop the center. The center's advisory board consists of members from: The Access Office for Students with Disabilities, the academic skills Learning Center, Special Education, the Office of Equal Opportunity, Computing Services, Student/Personnel Auxiliary Services, the College of Education, the School of Medicine, and Rusk Rehabilitation Center. Several representatives of departments on this committee have contributed financial support to the center's development.

The dynamic field of computer technology promises to open independency, educational, and employment doors for people with disabilities. Yet, lack of sensitivity and planning for the computing needs of people with disabilities is creating barriers. As society continues to implement computing technology without regard for adaptive access the technological promise is broken. Increasing numbers of people with disabilities, advancing technology, enhanced awareness of capabilities, and changing legislation are creating awareness of adaptive access needs. Adaptive computing access and services are keeping the promise.

For more information on STAR, or
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